University of Applied Science and Arts
Mechanical engineering
Organization and process management

Final Thesis

Matti Kangas

Development of project management process in Fastems Industrial Services unit

Supervisors	Prof. Dr.-Ing. Matthias Segner
	Prof. Dr. rer. pol. Wolfgang Greife
Commissioner	Fastems Oy Ab
	Industrial Services unit

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Abstract

Project management has an intention to reach a goal, with a defined schedule and budget. These two terms have to be reached with a temporary project organization and other resources.

This final thesis is made for the Fastems Group. During the last years happened significant growth of the personnel and new organization structure has brought along a new situation. Along with the changes Fastems has reformed the visions and business plan.

The objective was to develop the project management process in Industrial Services unit. At first the actual project management of the delivery projects was analyzed. After that a clarification of the possible project management actions in the Industrial Services unit was made. The results of the final thesis are the description of project management process and management documents, which are connected to project management process.

The progress of the final thesis proceeded like initially was planned. I am very satisfied to the result, which is a good starting point for the continuation development of the project management process. An opportunity to write the final thesis during the working days and experienced advices from the colleagues enabled to reach the good result.

Hannoverin ammattikorkeakoulu
Konetekniikka
Organisaation- ja prosessinhallinta

Matti Kangas	Projektinhallintaprosessin kehittäminen Teolliset Palvelut yksikössä
Opinnäyte	51 + 44 sivua
Valvojat	Prof. Dr.-Ing. Matthias Segner Prof. Dr. rer. pol. Wolfgang Greife
Työn tilaaja	Fastems Oy Ab Teolliset Palvelut yksikkö
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Avainsanat	Projektinhallinta, prosessi, kehitys, teolliset palvelut, prosessikuvaus, tehdasautomaatio, joustava valmistusjärjestelmä

Tiivistelmä

Projektinhallinnalla pyritään asetettuun tavoitteeseen, sille määritetyssä aikataulussa ja budjetissa. Tämä kaksi ehtoa tulee saavuttaa tilapäisesti kootulla projektinorganisaatiolla ja muilla resursseilla.

Tämä opinnäyte on tehty Fastems Groupin pyynnöstä. Viimeisien vuosien aikana tapahtunut merkittävä henkilöstö määrän kasvu ja uudistunut organisaatiorakenne ovat tuoneet yrityksen uuteen tilanteeseen. Muutosten myötä Fastems on uudistanut visioitansa ja liiketoimintasuunnitelmaansa.

Tavoitteena oli kehittää projektinhallintaprosessia Teolliset Palvelut yksikölle. Aluksi analysoitiin nykyinen toimitusprojektinhallinta, jonka jälkeen mahdollinen projektitoiminta Teolliset Palvelut yksikössä tutkittiin. Opinnäytteen tuloksena kehitettiin projektinhallintaprosessin kuvaus sekä projektinhallintaan liittyviä hallintadokumentteja ja -menetelmiä.

Opinnäytteen teko eteni hyvin alkuperäisen suunnitelman mukaisesti. Työn lopputulokseen olen erittäin tyytyväinen. Opinnäyte on mielestäni hyvä lähtökohta projektinhallinnan jatkokehitykselle. Onnistumista edesauttoi mahdollisuus kirjoittaa opinnäytettä työpäivien aikana sekä työtovereiden asiantunteva opastus.

Foreword

The last two years of my engineering studies were important, indicating the direction of the final thesis theme and field of industry. I was studying production economics and machine automation as the orientation studies. At the same time I was studying German, because it was the language of the becoming exchange studies. I had decided to study a double-degree, which had become possible by a co-operation between the Tampere Polytechnic and University of Applied Science Hannover. A visit in Hannover in April 2005 ensured my plans. The subject of my studies in Hannover was organization and process management. The first double-degree requirement was passing through of all Bachelor of Science studies in the Tampere Polytechnic. After that, I passed one study subject and final thesis in the University of Applied Science Hannover. This final thesis will be accepted in both places, and I will graduate with a Diploma degree (Hannover) and a Bachelor of Science degree (Tampere).

I found an ideal place to write the final thesis in a Finnish company, which has a subsidiary office in Göppingen in southern Germany. The name of the company is Fastems GmbH, a part of Fastems Group. A six months long final thesis period was divided. The first three months were orientation time in Finland. The last months I was working in Göppingen. The end period included writing of the final thesis and working as a project manager in one project.

I want to say thanks to Mr. Kaarlo Koivisto and Mr. Wilfried Stiller, the developers of the co-operation between Tampere and Hannover, also to the college mates, who helped me to go through this study process. Thanks to the experienced and friendly colleagues in Fastems.

I am grateful to my family, who gave me the irreplaceable support during my studies.

Hannover, 1st June

Matti Kangas

Contents

List of Abbreviations

CPA	Critical Path Analysis
CPM	Critical Path Method
DMC-LD	Double Master Crane – Light Duty
Fasto	Enterprise Resource Planning -software, specially named for the Fastems Group
FMS	Flexible Manufacturing System
FPC	Flexible Pallet Container
Incoterms 2000	International Commerce Terms 2000
ISO	International Standard Organization
JIT	Just in Time
Leanweb	Software for the management of service work assignment
MLS	Multi-Level System
MLS-MD	Multi-Level System – Medium Duty
MMS	Manufacturing Management System
MSC	Material Station Conveyor
Orgalime SE01	General Conditions for the Supply and Erection of Mechanical, Electrical and Electronic Products
PERT	Program Evaluation and Review Technique
SCC	Software Crane Control
TEKES	Finnish Funding Agency for Technology and Innovation

List of Figures

1. Introduction

In this chapter the starting point and objectives will be shortly presented. The project management process and operating methods will be described later on. The focus of the introduction is more process based. The final thesis is divided in the following five phases.

Phase 1: Expectation of the administration and definition of the final thesis

First phase defines the expectation of the administration and the definition of the final thesis. During the years 2005-2006 Fastems business growth was significant and caused some changes in Fastems Group. Because of this, the company was forced to make some organizational changes. A new organization structure was launched in January 2007. As a result, the new Industrial Services unit was created. It is the largest unit within Fastems, including 133 employees.

Based on this situation Fastems defined new visions and economical growth targets for this business unit. Fastems chose to create a new function within to increase the added value and turnover of the Industrial Services unit. This function is the project management. The objective of the final thesis is the development of project management process for the Industrial Services unit.

Phase 2: Analysis of the actual state

Second phase is an analysis of the actual state of the project management functions in Fastems for basic FMS business. This has a fundamental role for the final thesis. Since over 20 years the project management has been a remarkable part of the successful strategy. As a factory automation supplier, Fastems has to be in close contact with the customers. Therefore project management takes care of all necessary information exchange between all stakeholders and management of the project during the complete project phase.

The project management guarantees that a project will be lead through without serious problems. The project manager is responsible for customer satisfaction, and that the economical goals of the project will be reached. Currently projects are managed by the Factory unit. The actual methods of the project management will be analyzed and shown in the chapter three, Project Management – Fastems Oy Ab.

At the present time in Finland and in whole Europe the amount of delivered Fastems products, flexible manufacturing systems, is already more than 500 systems. More new products and product families have been designed and developed. The increased amount of the sold FMS, changes in industry and changing needs of the customer lead us to a situation that some projects might be done by the Industrial Services unit. The projects types can be a system move, extension and mechanical or software modification. After a clarification of the needs and requirements of these projects, this sector can be considered as one of the core function.

The nature of such international project management business has to be noticed. For example specific environmental conditions and functioning communication between all stakeholders has to realize.

Phase 3: Definitions and success factors of the project management process

During the third phase the definition of the project management process will be done. The results of this phase are definitions of the core functions, main and support processes and project management process ground for the chain of functions. In the future it is important that Industrial Services unit has the competence to sell extensions and modifications to the customers. The customers are willing to develop and update formerly a cost-effective system, therefore to avoid the unnecessary production breaks of the system. The benefits can be a longer lifetime of a system, improved capacity with the extended system and improved efficiency by a modification of a system part.

The image of Fastems can be improved by a well-kept project management. At the same time the economical benefits of a customer will be increased, and of course importantly, the benefits of the Fastems Group.

The important success factors in the project management are planning, communication, documentation and the follow up of main processes. The main project processes are the kick off, implementation and closeout. A success of the project can be raised with a quality and risk management. This improves the economical efficiency, when the problems and misunderstanding during the complete project can be avoided. The support processes, like a resource management, change management, purchasing, delivery and invoicing, improve the success of the whole project management process. In fact, there are no project management methods or competence inside the Industrial Services unit. That is why some of the project management methods of the Factory unit have to be transferred.

The complexity of the projects can not tolerate an underestimation. A successful through-lead demands same kind of project management methods as new systems deliveries.

Phase 4: Clarification of the operating methods

During the fourth phase the new operating methods will be defined. The most important result is to create the main and support process flowcharts and flowchart documents. This helps to achieve an optimal way to manage the projects.

In this phase the quality of project management process will be noticed. The improvements of quality can be made by more accurate planning, quality and risk management, and functioning communication and information during a project.

Phase 5: Implementation of changes

The fifth and last phase is a plan, how everything will be put into practice. This is presented in chapter six: Conclusion. The objectives will be reached, when necessary changes have been successfully settled and there are projects, which are lead profitable by a project manager of the Industrial Services unit.

The best way to carry out the implementation is a pilot-project. It should be lead through with the methods that have been planned and created. Also an important part of a successful result is experience, which can be gathered from installation engineers and project managers. This experience helps to find out the right kind of solutions. After the implementation, the project management flowcharts and operating methods can be improved and re-created.

2. Approach

In this chapter the important facts and figures about Fastems will be presented. It will bring out a little bit deeper information about the values and visions. To get a better idea of the company, there is also a review of the products. Industrial Services unit, the commissioner of the final thesis, will be also presented.

2.1 Fastems Group

The business operation of Fastems started at early 20th century. At that time Fastems was rooted into Mercantile's machine division. The owner is Helvar Merca Oy Ab, which is a privately owned Finnish company. The remarkable milestones in the history of the Fastems are:[1]

- 1958: The Manufacture of the first machine tool
- 1982: The First FMS delivery
- 1990: Robotics as a new product line
- 1991: Sales office in Göppingen, Germany
- 1995: Mercantile Machine Tools acquired Fastems
- 1996: Sales office in Kungälv, Sweden
- 1997: New factory site at Lahdesjärvi, Tampere
- 1999: Mercantile Machine Tools and Factory Automation incorporated, Fastems Oy Ab founded, sales offices in France and Great Britain
- 2001: FPC, Flexible Pallet Container launched, sales office in Italy
- 2003: Service office in Härmä, the first Fastems full service contract
- 2004: RPC, Robotized Production Cell launched, Linesprint, roll cleaning device launched for the paper industry, the 400th FMS sold
- 2005: RPC-G launched
- 2006: Fastems LLC founded
- 2006: Sales office in Kaunas, Lithuania

[1] Reference/10/: Fastems internet site, History

At the moment Fastems has expanded its roots to everywhere in the Europe and to the United States of America. Globally in the Fastems Group are working about 370 employees. Most of the employees are working in Tampere, Finland. It is the place of the headquarters and production. There are also offices in Härmä, Jyväskylä, Lahti, Pori and Vantaa. In Finland the industrial service business has a great role, and more than 70 employees are working in this sector.

The other regional offices:

- Dartford, UK
- Kungälv (Gothenburg), Sweden
- Göppingen, Germany
- Lyon, France
- Milan, Italy
- Kaunas, Lithuania
- West Chester, Ohio, USA

Every regional office is a division. Fastems Group is formed from these divisions. The figure below shows graphically the structure of Fastems Group.

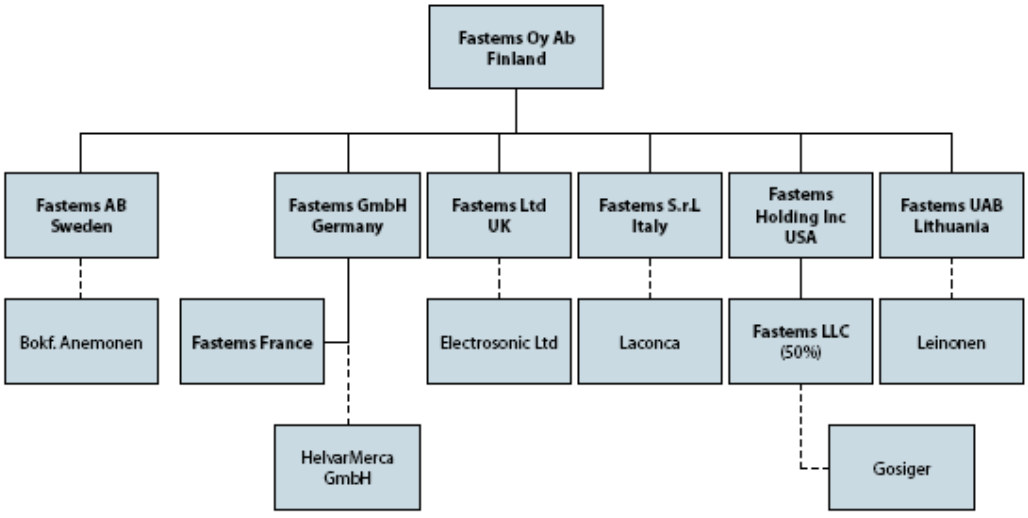

Figure 1: Organization structure of the Fastems Group[2]

[2] Reference/12/: Fastems intranet, Organization

2.2 Fastems – Factory Automation Supplier

Fastems is a leading factory automation supplier, nowadays a fully recognized partner in different types of customer groups. The customers are subcontractors, product factories or a company in aerospace or automotive industry. Fastems has also lot of customers in vehicle, construction machine and machine building industries.

Figure 2: Fastems brand

The goal of a factory automation supplier is to help a customer to use efficiently the annually available production hours. All products and services have an aim to increase productivity through an automation and unmanned production.

The figure two above is the Fastems brand. The number 8,760 represents the amount of the available working hours in one year. The hours per year:
365 days x 24 hours = 8,760 hours.
Fastems is an open system integrator, which means that the automated manufacturing systems are flexible and extendable. The systems are compatible with over 40 different machine tool manufacturers. An extensive range of solutions and industrial services, which are supported by a world-wide network of the partners are the fundament for the leading factory automation supplier.

The values are set by a desire, which is to be the best automation supplier in earlier mentioned industrial sectors. These values reflect the to high quality standards, which are defined in the company's quality policy. This policy is based on the ISO 9001 standards.

"Fastems wants to be the best factory automation supplier in the chosen field of industries. The corner-stones of our operations are:

- Respect for agreements
  - All written and unwritten agreements
- Customer satisfaction
  - We listen to our customers.
- Appreciation of partners and personnel
  - We commit to teamwork.
- Profitable business to ensure continuity
  - We look after our financial welfare.
- High technical standards for all machinery
  - We invest in R&D and employ the best professionals in the field."[3]

Due to this quality policy, Fastems has set the goals. The main goals are to improve customer's competitiveness through automated and unmanned production technologies, benefits as a result of increased capacity, flexibility, quick return on investment, and comprehensive range of solutions and services to fulfill the specific needs of production lines.

In a relation to the goals can be noticed a newspaper article.[4] There is an inquiry made by TEKES. The article tells that only few percent of the Finnish companies consider moving their production to a foreign country.

"We contradict that one third of the companies will not fold up production in Finland"; says technology expert Juha Suuronen from the TEKES. "Only two percents of the companies consider moving because of the cheaper costs of production. Notable is that a greater amount, about 3.5 percent, consider moving if their customers move first. A half of the 300 answered companies are working in metal industry", he continues.

[3] Reference/7/: Quality manual of the Fastems, page 5
[4] Reference/9/: Production stays in Finland Marko Laitala, Tekniikka & Talous(Technology & Economy)

During the inquiry was found out that centric question is, how to organize production that it will be more flexible, effective and competitive. This is why Fastems and other similar companies, which are improving customer's productivity, are now and will become important stakeholders in European wide industry.

2.3 Fastems products – Flexible Manufacturing Systems

The product portfolio extends from flexible manufacturing systems, machine tools, industrial robots and production cells to quality control devices of the paper industry. During the last 20 years Fastems has delivered hundreds of automation systems and production cells. Fastems co-operates closely with the major machine tool manufacturers and dealers, because they are delivering machines for every FMS.

The customers are from diverse field of industries. From the automotive industry, where production has to be efficient and at the same time tests of a new part production will be lead-through or from the aerospace industry, where management of tools and traceability of manufactured parts have an important role. Customers are also in the vehicle, construction machine and machine buildings industries, where a flexible Lean manufacturing with a JIT production can be reached. The systems can cover typically daily production of about 50 different parts. For the subcontractors and product factories systems can bring the better logistic characters, quicker and firmer estimations of delivery time during the production turbulences. The following subheadings give an idea of core the products.

2.3.1 MLS – Multi-Level System

Multi Level System is the main idea behind the FMS, and it can be constructed by the modules like cranes, material and loading stations. Fastems modules are connected to the machine tools and robots through storage. The systems modules are controlled with software, which are presented later. Multi-Level System is a common name for these systems that can vary in pallet and warehouse size and number of machine tools.

MLS with a large storage capacity and minimal floor space utilizations increases productivity, and allows system to grow as large as production goal demands.

The key feature of the MLS:

- compact, modular and easily extendable
- large storage capacity with minimal floor space utilizations
- material pallet handling in the same system
- material transport on standard EUR pallets or special material pallets/bins
- high speed stacker crane enables a efficient transfer of the pallets within the system
- enhanced integration capabilities including the option to integrate any machinery as well as manually operated cells

Figure 3: Multi-Level System

2.3.2 FPM – Flexible Pallet Magazine

FPM is a minimized version of the MLS production complex. It is especially designed for the small and medium-sized plants, and is an ideal way to get benefits from unmanned production with an affordable price. The systems components are the same and extension possibilities are good. A minimal need of maintenance and great usability improves the efficiency.

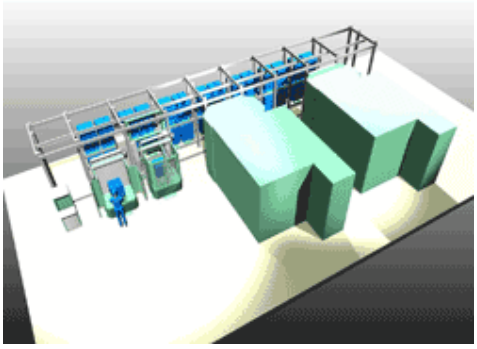

Figure 4: Flexible Pallet Magazine

2.3.3 FPC – Flexible Pallet Container

FPC is a pre-installed FMS, which is delivered and used in a container. This is why the installation and start-up can be made during a one day. This is important when a customer is improving production, and wants to reach higher production effectiveness as fast as possible without long production stop. The FPC products are normally sold by the machine tool dealers. FPC is designed for a specific machine tool type, and it contains same system parts like a FMS.

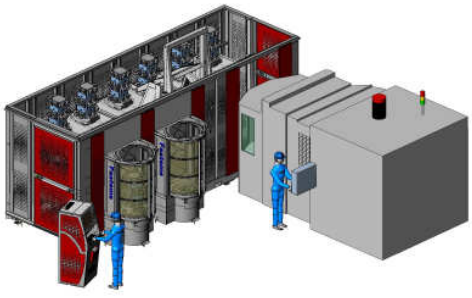

Figure 5: Flexible Pallet Container

2.3.4 MMS – Manufacturing Management System

MMS control system comprises configurable software product family. The characters, like an object-oriented architecture and extensive configuration possibilities, make it scalable from small systems up to factory-wide manufacturing solutions. From the user point of view it simplifies the use of system parts. By this program customer can maintain and update the information of the required products deliveries. User can set the amount of products, required delivery day and CNC-program. After this the MMS calculates required time of production, and starts automatically to produce the required products.

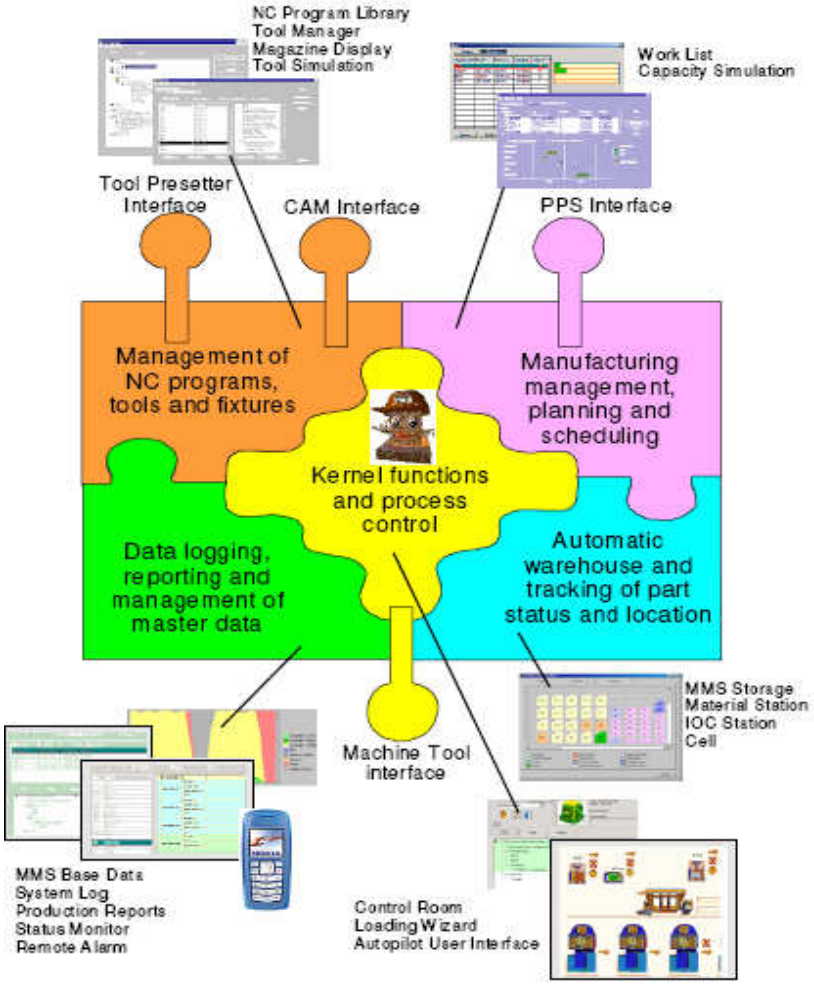

Figure 6: Properties of the Manufacturing Management System

2.4 Industrial Services unit

Industrial Services has to be also considered as an important “product” in the Fastems product portfolio. In the following figure presents the structure of the Industrial Services unit.

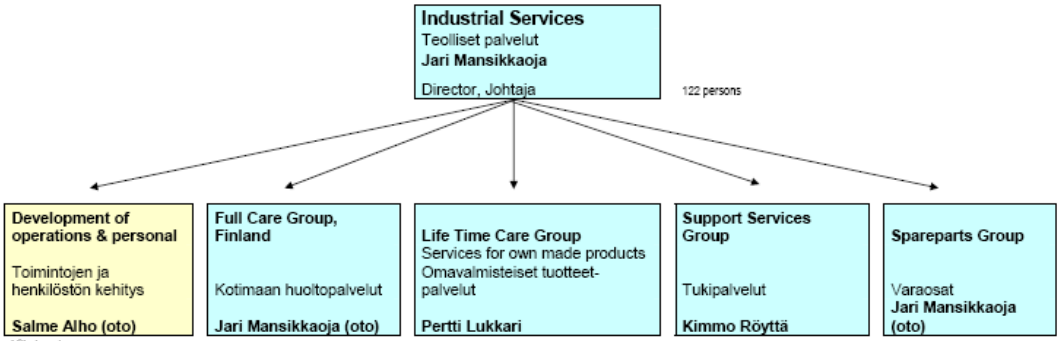

Figure 7: Structure of the Industrial Services unit

Customer needs to improve the automation level punctuate the importance of preventative maintenance, which minimized the unexpected equipment breakdowns, and thereby production stops. Fastems helps customer to improve the maintenance of the production machines by offering two types of service contracts, Full Care Group and Life Time Care Group. A great advance in usability has been discovered. That is why, the service operations have been a fast-growing business area.

Fastems has developed the content of the service contracts for the individual requirements. Full Care Group is for a customer, who wants to outsource the complete factory maintenance. A contract covers preventive and fault service of the machines, and installations in customer’s factory. Life Time Care covers maintenance and service of the own made products.

Important support service is Teleservice, which allows reaching the service daily 24 hours. Call Center connects the calls to the specialists and local service offices.

3. Project management

In this chapter tells about the history of the project management. After that is a review of international project management and basic methods of the project management. At the end is a review of actual project management in the Factory Unit, which is a fundament to the clarification of the project management in the Industrial Services unit.

3.1 History of project management

In the history of project management the industrial revolutions have acted the role of accelerators. During the first industrial revolution in 18th and 19th centuries started blowing the winds of new era. Working at a factory replaced the normal goods gathering from the houses of craftsmen. Long and multiple work phases in the factory required the sophisticated systems of transportation, storage, resources, manufacturing, assembly and distribution. Those and responsibility of the workforces have forced to establish new institutions and organizations, and to develop the management methods.

New wave to the direction of the modern project management started during the second industrial revolution. This took place, when European industrialized countries were fighting against each others in the First World War, whilst there were also new emerging technologies like the electrical devices and new motor types. A mass production of the customer goods offered a place for new business management. During the World Wars were also large logistic operations, which required the planning and supplying methods.

The final breakthrough of the project management has happened after the Second World War. The development of computers was enabling a free spread of information through the internet. After the Cold War, US military has developed lot of management tools such as the earned value and work breakdown structures also the well-known CPM, CPA and PERT tools. The Risk Management and Total Quality Management (TQM) has developed during the late 20th century. After that more attentions were given to the business benefits of the projects.

3.2 International project management

This subheading scopes the things, which have to be noticed during an international project. FMS delivery project can be taken as one. The joining stakeholders like the customer, supplying company and subcontractors have to combine their operations. At the customers site will be implemented a new system, a new technology will be supplied, and its affects on the customer's production and work of employees.

A project is described as an aim to archive the specific goals with the defined budget, schedule and resources. An international project is described in the following way:
"An international project is a project that involves multiple locations in different countries or cities, entities, organizations and business units. In international project the problem is time scoping. Lots of things have to be changed and done. If the project is big, there is always greater risk and complexity might be a risk for the whole organization."[5]

[5] Reference/5/: Bennet P. Lientz, Kathryn P. Rea (2003), International Project Management

The different companies in different countries have their own regulations for example about a standardization and safety requirements, which are sometimes set by a government. Some relieves give the county or continental wide regulations for transportation, assembly and installation. These things have been clarified in the Incoterms 2000 and Orgalime SE01. The international project management takes place because of a worldwide manufacturing and distraction, without it company's global presence in the industry is impossible.

In a addition to the above mentioned factors during a project, either new delivery projects or system move, extension or modification, have to be realized the own and customer's self interests, require of local knowledge and support, and foreign working culture.

3.3 Project management - Fastems Oy Ab

In the introduction chapter was earlier said that in the Factory unit have been more than 20 years project management methods, which are specialized for the own product deliveries. The project managers have been gathered information from the practical aspects. These things have been noticed by the chiefs of project managers. Then have been development new management tools and -software, cost efficiency and reliability of the project management methods. The improvements are new project management methods or tools, like interne audit documents, quality plan, check- and action lists for a project manager, memos for installation meetings, and commissioning and installation folder.

All these guidance are necessary, because everything have to be controlled. Documentation of a project has to be organized and updated; the information has to be available in the specified places, when for example an extension or retrofit project will be done. The system layouts and electrical diagrams have to be updated, because some electrical wiring or mechanical characters might be changed.

Fastems has developed the general code of conduct of the delivery project management. It describes the phases and methods, which have to be done during the project. These secure the economical and technical success of the projects. Staying in a project schedule is also important, it guarantees the customer satisfaction.

The important result of the analysis of actual state of the project management functions in Fastems is a conversion of general code of conduct to the graphical flowchart form. The flowcharts describe the actual project management process[6].

The above mentioned project management tools and actual project management process are the fundament for the development of the project management process in Industrial Services unit.

[6] Appendix 1: Project management flowcharts of the Factory unit

4. Industrial Services unit – project management

In this chapter the typical projects of the Factory unit are presented. Then is a clarification of the potential projects, which might be transferred to the responsibility of the Industrial Services unit. The fundament for the development of the project management processes are the actual methods in Factory unit. The reason, why to take seriously the methods of the Factory unit is that the implementation of new project management procedures can be introduced easier.

4.1 Clarification of potential project types

At the moment Fastems are doing delivery projects, where the budgets are between 50 000 – 2 000 000 euros, design hours between 50 – 1500 and installation hours are 50 – 1000 hours. A delivery time for these projects is chancing a lot, depending on a project type. Below are listed the project types:

- New system delivery
- System extension
- System move
- System modification

An important approach to the clarification of the potential projects was that the transferred projects suppose to include lot of installation hours and less design hours, because at the moment Industrial Services unit does not have own design resources. Thereby a large part of the budget can be calculated to the turnover of the Industrial Services unit. Later have to be clarified, what kind of competence is missing. This indicates, which resource competences have be added to the Industrial Services unit.

For example almost the half of a new system delivery project budget is formed by design hours, but a budget of system move consist only 20% design hours. The potential projects types for the Industrial Services unit would be the move and extension projects, also special types of modifications. Often modification projects require proportionally more design than new system deliveries.

4.1.1 FMS move

This type of project is made, when customer wants to reorganize production logistic. FMS can be moved inside a factory area or to another production location. Typical example is, when a large company buys business operations of a little one, which have a FMS. The new owner invests money to the more efficient production and material logistic. The reorganization of production requires move of the FMS, which can be also sold to another company, and it has to be moved to another location, country or even another continent.

As earlier mentioned, these projects do not require so much design. The most important part is an implementation. The implementation phases suppose to be accurately planned; dismantling, time of transportation and re-installation of the FMS and machine tools. It is important to have the right kind of hand tools and other equipments. For example a forklift and scissor lift has to reach the defined height.

4.1.2 FMS modification

FMS modification and in the next subheading presented extension are the projects, which have to be sold to a customer. The customers do not know what kind of new options they have. These options increase the production efficiency and liability of the system. Fastems are developing new system components and control updates. This is why Fastems has to have a plan, how to sell these modifications. The modifications can be in system control or mechanical. A modification in system control requires normally lots of software design, so some of these projects do not fulfill the basic idea of the potential projects of the Industrial Services unit. In the future the required resource needs have to be carefully planned.

A modification project can contain a system part update or replacement. Also an electrical or mechanical interface for a new machine tool, robot or wash machine. A new machine requires sometimes extended storage. That is why a modification project can contain also a system extension. The loading and material stations can be modified, with a hydraulic installation or totally replaced with a new station.

Sometimes the modifications projects have very low-scale budget, when there is just a connection of an extra client or server change. These types of works cannot be taken as a project. Some kind of describing guide line should be done, which defines the line between the projects and normal service work assignment.

4.1.3 FMS extension

As earlier said, there is a thin line the between extension and modification project. FMS extension project can be described purely as an extension of storage, when a customer wants more pallet places to the system. The extra places in the storage might be for the raw material pallets or machining pallets. An extension can be improvement to the material logistical problems. The length of the system will be normally extended, not the height, because the extension to this direction requires lots of changes in storage and also modifications in a stacker crane.

4.2 Developing project management process

Normally when a company is developing the processes, the centric processes and core functions are re-designed. The developing based on the company's aims and visions. This means a radical change, which means a re-planning of the chain of functions of processes. Now the aim is to develop a new procedure for the Industrial Services unit. It will be a project management. This procedure will be seamlessly connected to the methods of the Factory unit and changes will be kept as low as possible. The ideal situation would be in a future that the Factory unit can concentrate properly on the new system deliveries. They can develop their own project management processes. The Industrial Services unit takes care of the projects, which are clarified in the previous subheading.

The prime meaning of the core functions is to satisfy the needs of a customer, it is the role of the factory automation supplier. The following figure is an illustrator of the core functions. There you can see the important functions of a delivery project, thereby for the most important business area of the Fastems.

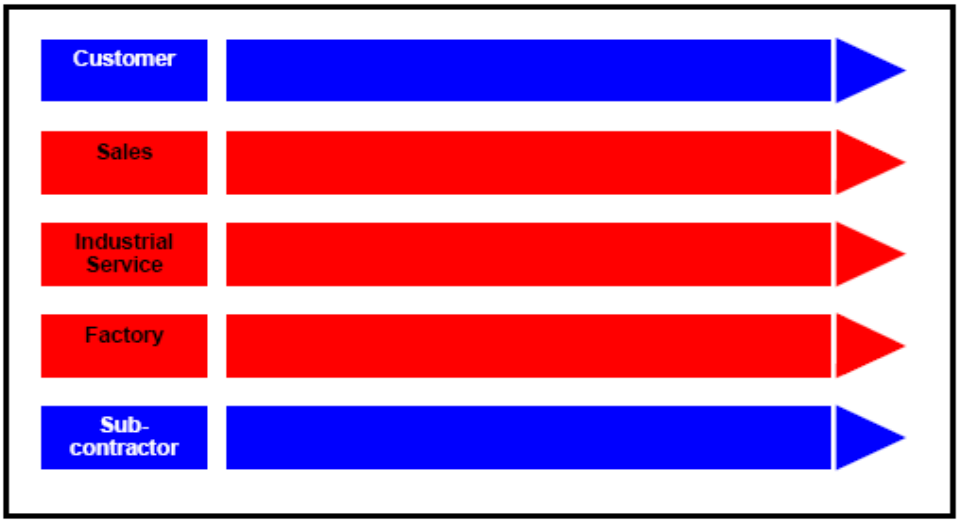

Figure 8: Core functions of delivery project

After the definitions of the core functions the main and support processes have been defined. The main processes; kick off, implementation and closeout can be separated from each others. The milestones of a project can be set between the main processes. Unlike the main processes, the support processes are running through the whole project.

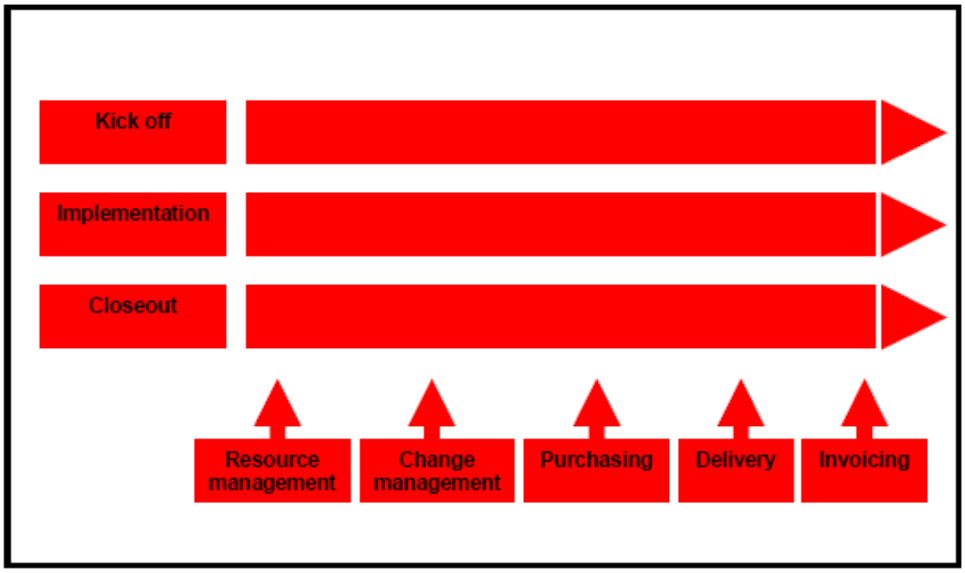

Figure 9: Main and support processes of delivery project

The project management processes can be presented as a dynamic chain of functions. The chain of functions is consisting of many work assignment, which are made in the different units and organizations. The figure below presents a project management process ground for the chain of functions. The new processes will be created in the next chapter, and the chain of functions will be presented more accurately in flowcharts. A customer is a receiver of the delivery project.

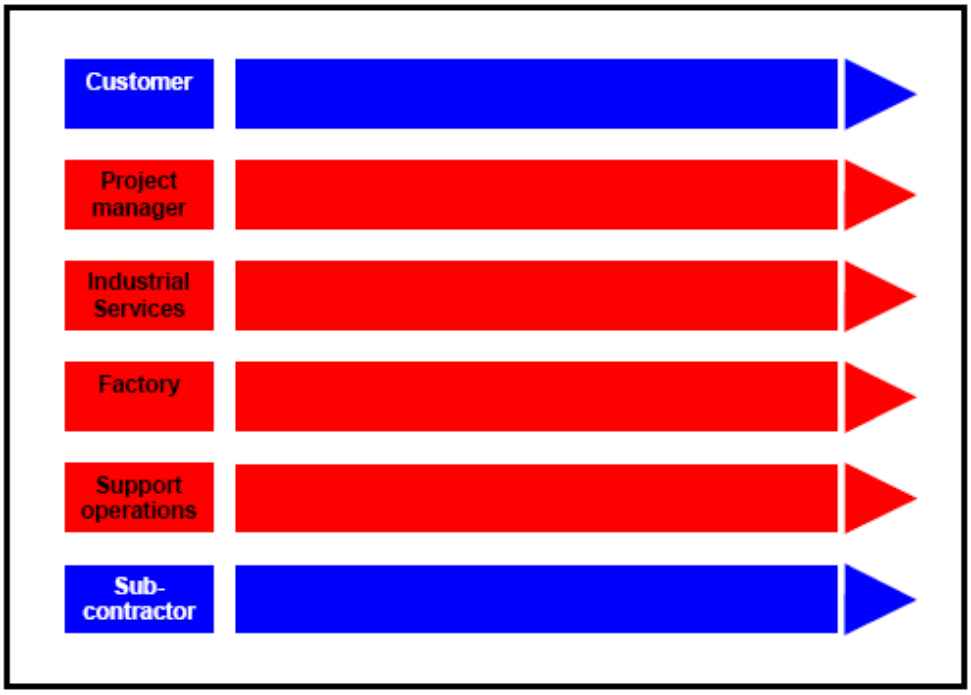

Figure 10: Project management process ground for the chain of functions

5. Project management process

A process that has been evolved for the project management today is a description of actions, which are needed to identify, select, plan, execute and control and closeout a project. In this chapter the project management process is divided to the main processes and support processes. The description of actions of the projects is modified. The important actions are a project kick off, implementation and closeout. Have to be noticed that the kick off phase includes important actions from the quality point of view, like a project planning and risk management. The modification meets the needs of earlier defined project types.

The work assignments of the projects are presented in the main and support processes. The projects have to be supported by the complete organization. Without a support the main processes cannot be done. This is also noticed by David I. Cleland, he says; "Projects require structure in the form of a life cycle to properly support an organization".[7]

5.1 Quality in project management process

The subheadings of this will chapter describe the important supporting tasks and activities, which are tightly connected to the quality of project management process. It is not just a responsibility of a project manager but the complete organization in every action and phase. A quality has a noticed symmetry with the project requirements, and does not just consist in one thing; it is being formed of numerous little parts of the project. Risk management plays an extremely important part in the project quality. It is preparedness to an unexpected situation, and avoids the incomplete planning.

[7] Reference/6/: David I. Cleland (2004), Field Guide to Project Management, Second Edition

5.1.1 Setting and planning

A project setting starts, when a sales person has sold a new system or one of the earlier defined project types. First a raw project schedule has been decided with customer and also resource inquiries have been done to service and design managers. This happened normally in a delivery time meeting. A project manager will be named for the project, after this a project planning can be started.

The project planning requires a collection of information and refers to the importance of creating a detailed outline of the required stages in the implementation process. Planning includes also a work breakdown and resource scheduling. Scheduling is generally understood as the tasks of creating specific time and task-interdependent structures, such as critical path and Gantt charts. The accuracy of a project schedule supposes to be one day; the example of project schedule is in appendixes[8]

The collected information has to validate during the planning. The accuracy of the information changes, because the source, relevance and context of the information are changing every time. Planning requires a realization the real cost of the project. If a visit of project manager at customer site is not budgeted, a sales person has to control the real conditions of the installation area. The needs to the visit at the customer factory based upon the budgeted project management cost and complexity of the project.

The project managers have to identify the important personnel skill, which are required for a successful project completion. This is important because the different project types require different type of skills. For example a system move does not require a software talented person on site to restart the system, but the projects with a control modification is total different case. In every project a disciplined approach to planning should be remembered, the same technique every time.

[8] Appendix 2: Example of project schedule

5.1.2 Quality and risk management

A quality and risk management is a systematical analysis of project during the complete project, from the planning phase to the though-leading. The tool for the quality and risk management is a checklist that guarantees a better quality of project. Control of the checklist requires that an exchange of information between a project manager, customer and other project stakeholders works without problems. Different nationalities and foreign language cause difficulties.

"It have been studied that almost half of international projects fails dramatically in some level, because of complexity. The failing factors have to be covered with the critical success factors."[9]

A treatment of an international project as a standard project has to be changed with collaborative efforts. In the chapter 3.2 International project management has been presented the reason for the complexity of international project. Lacks of measurement, incorrect information and confusions have to be avoided.

The quality and risk management during the projects will avoid the planning and designing mistakes, this increases a success of project. Important is that every single work phase can be led through successfully in the planned schedule. At the same time will be confirmed that during the project all required work tasks are done, and tools and right type of material are ordered. The quality and risk management of projects can be found in appendixes.[10]

[9] Reference/5/: Bennet P. Lientz, Kathryn P. Rea (2003), International Project Management
[10] Appendix 3: Quality and risk management

Sometimes a customer demands work assessments, which decrease the possible risks of implementation phase and prevent accidents. Typically requested are the Method Statement and Risk Assessments[11] and sometimes also the Safe System of Hot Work[12]. The documents were made during the orientation period of the final thesis. One customer was requiring those. Afterwards these documents can be easily reformed to other projects.

[11] Appendix 4: Method Statement and Risk Assessments
[12] Appendix 5: Safe System of Hot Work

5.1.3 Communication

The major weaknesses during the planning today are lacks of definitive project requirements and poor communication. A customer is the one, who defines the needs and requirements through the statements that specifically identify a product or service.

The adequate communication channels are extremely important to create an atmosphere for a successful system implementation. A successful made plan phase requires also working communication within the project team, between the team and the rest of the organization, and with the customers. Typically communication involves issues such as the projects capabilities, goals of the implementation process, changes in the policies and procedures, and status reports.

The typical communication lack takes place during the project planning, when ordering spare part or requesting resources. Information about free resource or delivered spare part supposes to come automatically with important details, like the price of spare parts and how soon it will be delivered. This decrease the work burden of the project managers

Later created process flowcharts will define, in which phase some important information has to been given. This information is about becoming phases, for example a delivery or invoicing information to the customer or same kind of internal information. Feedback information to the project manager has to come automatically, when he is requesting resource.

To improve the functionality of project communication, have been also created a table of the work breakdown structure of project manager[13]. The last column of the table describes need of required feedback information. This information is important to the project manager. When feedback information comes, he knows that the work assignment will be done

[13] Appendix 6: Work breakdown structure of project manager

5.1.4 Documentation

The aim of documentation management is to improve the use of documentation. The project documentation is maintained in project's electrical folder, which can be found from the company's server. Project manager has also an own project folder, where will be maintained some extra information about the project[14].

Electrical folder contains following documents:

- Initial data/plans
- Audit
- Project detail info[15]
- Pictures/Layouts
- Invoice/Delivery
- Exchange of information
- Technical specifications

For every FMS is created a device card. The device card can be seen by everyone employee of Fastems and updated by the authorized persons. These device cards can be found out from Leanweb. This software will make searching and maintaining of the technical documentation easier. There are a specified data, like device number, contact persons, system modification, layouts of system and buildings and electrical drawings. Project manager has to update some of these data during and after the project.

Other software is Fasto, which is a tool for project managers to create a construction structure an ordered system. The structure will be complete by a designer or person in supporting operations. A budget and calculation of the costs are made also in this software.

[14] Appendix 7: Project folder
[15] Appendix 8: Project detail info

5.2 Main processes

Industrial Services project life cycle includes three main processes:

- Kick off phase
- Implementation phase
- Closeout phase

These are the main project processes, which have to be carried out during every project. For every process has been created a chain of function, so called flowcharts. The process ground for the chain of functions has earlier presented in Figure 10. Afterwards the subheadings give the description of processes and a flowchart for every process can be found from appendixes[16], as well as the explanations for the flowchart color codes[17]

5.2.1 Kick off

This phase of a project will started with project setting. The setting contains technical requirements of the customer. A sales person has made the cost estimation and the budget for the project. During the delivery time meeting a schedule of the project is defined.

After the choice of project manager the planning will start. There are some important things, when choosing a project manager. A customer and project type define the needs. If the customer is ordering a second FMS, then it is reasonable to choose the person, who knows the customer already. The language skills are also important, because Fastems are always trying to serve with the native language of the customer. Some of the project managers are concentrated on system modification or new FMS deliveries.

[16] Appendix 9: Main process flowcharts
[17] Appendix 10: Flowchart color codes

The planning starts with a resource clarification. Then the project manager goes through every technical and economical requirement. During the planning material requirements are defined, and the purchasing reservations are requested. Vital is that the project managers answer to the some fundamental questions not only at the start of a new project, but also though the implementation. During the implementation comes out changes of material and resource needs. Or perhaps a new resource plan has to be made, because of needs of other project.

5.2.2 Implementation

Implementation is phase of a project, when everything what have planned will be executed with a good sense of control. The result of this phase is the delivery of the product or service and acceptance by the customer. This phase relies heavily on the project plan, which guides the actions of the installation team. Before moving to the customer's installation site, the implementation team gets the startup info[18]. This includes basic information about customer, hotel and raw project schedule,

A communication with the customer and project employees has to be kept almost daily. The information has to be updated. Without updated information, the control is not possible. The implementation period of project is normally from two to six weeks or couple of weeks more with a freight and transportation.

[18] Appendix 11: Startup info

The implementation phase of new system delivery consists following activities: a system and machine installation, commissioning and training. The projects made by Industrial Services unit will not normally include training. This is because there are same users, and they do not need extra training.

The implementation phase of the system move and extensions are mainly installation and commissioning. A control modification has totally different implementation phase, without a remarkable installation have to be concentrated on commissioning and training. For example updated MMS with new user interface requires training.

5.2.3 Closeout

One way how the project managers save organizations money and resources are by ensuring a thorough and effective closeout. The project closeout ensures that all parties, which were involved, are aware that the project is closed. At the end closeout info[19] can be given and received, which is important for moving forward to next project. A closeout meeting for small projects is unreasonable to organize; therefore the feedback can be given by e-mail.

Feedback can be given also personally through the summary of the project, which can be delivered to every person, who has taken a part to the project. The summary includes the project assignments and reached results; time, costs and resource savings and losses. If for some reason the project has not ended on schedule, in the summary has to given the information about continue of the project. So called project tail has to be defined, and all becoming work assignments have to have a description.

[19] Appendix 12: Closeout info

5.3 Support processes

These support processes are running during the complete project. Project life cycle of the Industrial Services includes five support processes:

- Resource management
- Purchasing
- Invoicing
- Change management
- Delivery

The subheadings describe about these processes and created flowchart for every process can be found from appendixes[20].

5.3.1 Resource management

The resource management is nowadays extremely important, because companies have lot of personnel and the efficient use of resources requires a good organized management. A large part of the projects costs are formed of working hours. For example a work hour cost of a design employee is different than the costs of an employee in a delivery installation team. For a project manager has also calculated a specific work hour cost. The aim of the resource management is an optimal use of the resource, without overloading or underloading.

The resource management will be handled like earlier. The tool for this is called as a ResourceMasterCalender, which is an excel-table, uphold by the authorized resource managers. There are managers for the delivery installation, commissioning and training.

[20] Appendix 13: Support process flowcharts

5.3.2 Purchasing

Purchasing is an important support process for companies, who have outsourced a part of their manufacturing processes. Also for own manufacturing processes, a purchasing will guarantee that the necessary materials are at the customer site when needed. A project manager has the responsibility to inform purchasing about the needs. The purchasing support is needed during the complete project.

Earlier mentioned projects, like extensions and moves, require mainly parts for storage. In the process flowchart the main concentration is for this matter.

5.3.3 Invoicing

The project invoicing is done, when some of the milestone is reached. Duration of a project can be months or even longer than one year. This why, it is important to set some milestones and divide invoicing for the complete period of the project. The delivering company has to pay the material and personal cost during the complete project not only at the end of the project.

Invoicing is carried out differently in different type of project. Invoicing can be divided to three parts; after the sales contract, delivery, and acceptance. This will be done when the size of the budget is big enough. The project manager informs invoicing after the delivery and acceptance. The invoice plan is made with customer and it has been described in the sales document.

5.3.4 Chance management

As earlier said in the kick off phase, the changes during a project are more likely than rare, and can be formed because of a customer, machine dealer, and subcontractor or delivering company. That is why the change management process has to be also planned. Typically the source of a project delay can be a delivery delay of machine dealer or subcontractor, customer's late production stop, design mistake or incomplete planning by a project manager.

5.3.5 Delivery

This is the first phase of the implementation process. The tools and new or replacing systems parts will be delivered. The Factory unit had gathered information about the required tools for system installation during the hundreds of FMS deliveries. A toolbox contains all these tools. Often the toolbox, dimensions 1.5 x 1.0 x 1.0 meters, is also delivered to the installation place.

Important is to plan the correct delivery times, because a freight to southern Europe and England last normally approximately two week. The ways of the deliveries vary a lot, depending on weight, dimensions and urgency. The delivery info[21] includes important details, like the delivery time, delivery contact person and address details.

[21] Appendix 14: Delivery info

6. Conclusions

In this chapter the results and discoveries of the final thesis are presented, also a little overview to the final thesis period. The actual results are made in the chapters four and five. The last part of the conclusion is focused on further development. It also describes the actions and methods, which increase the functionality of the Industrial Services unit projects and internal co-operation. The question is how every action and process that will be made might work better; by the time-, resource and cost saving way, and how we can connect every process seamlessly together. Later on the aims and visions of the future strategy have to be set by the decision-making persons.

The projects types, which are made in Fastems, cannot be considered as typical projects, which are presented in the literary of the project management. Most of books deal with different type of projects, like developing a new product or product improvement, construction projects or selection of adaptable software for resource management. The process-orientated approach to this final thesis was well decided. The project managers have many simultaneous projects, and there have to be created some automatically running processes to simplify the heavy work burden of the project managers. The supporting processes can be developed and automated, which discharge more time for planning, and for quality and risk management actions. Ideally this means that functional process flowcharts are first created and developed, and then followed by the whole organization. Through-leading the projects by this way will save lots of time and personal resources.

Because of the developed processes, there will be new released recourses. More efficiency use of resource is important during times like these. Changes in the industry and market demands are the most important stakeholders. Fastems Group is growing all the time, more people are hired. The employment of new work forces is unavoidable, but during every growing phase the increment of the employees is not the right solution. Sometimes the most important thing is the self controlled growth with the development of own actions, internal and external working processes and methods.

One operational process can be developed alone. It has to be remembered that inside one operational team everything is planned, and can function very well, but the interface and management with other processes also have to work. It is important to develop the whole project management process as accurate as possible. This includes all processes and actions.

I have noticed that sometimes the implementation period of project is punctuated. The important planning phase might be forgotten, and it does not has enough attention. The time and resource pressure, which have been converged on project managers can cause this. Earlier mentioned independently functioning support processes can help in this case.

The projects of the Industrial Services unit are varying very much. The typical plan-do-control-act-phases cannot be executed. Sometimes the modifications projects have very low-scale budget, when there is just a connection of an extra client or server change. These types of works cannot be taken as a project. Project is not an appropriate name for any work assignment. A describing guide line can be done later, which defines the line between the projects and service work assignments.

The potential project types of the Industrial Services unit would be a system move, extension and special types of modifications. The project costs can be reduced, if these projects can be done by the local service offices. This is the important reason why some projects can be transferred from the Factory unit, which is not as flexible as the Industrial Services unit.

Often system modifications require proportionally more design than new system deliveries. For the system modifications projects can be later designed the sales and development plans. A fully redesigned and built control packet can be sold and installed to a customer. Thereby we will not be always so dependent to customer’s investments plans and industrial structure changes. This is a strategically important dimension.

When a customer has a 10-20 years old system, the system control parts of a FMS can be totally mixed. It might happen that for the old control components can not be found any replacing components. The truth has to be faced, and the customer has to make investments to the system control, software and hardware.

The first period of the final thesis was orientation to the project management methods. I analyzed the actual way of the delivery project management. During the end period I found out the variegated side of the project. I was going through the theoretical process of the project management, because I was writing the theory part of the final thesis. At the same time I was working as a project manager in one system move. Two working days before the actual start of the implementation phase our customer said that there will be a two months long delay. It was like a lightning from the bright sky to such an inexperienced project manager like I was. This was an excellent demonstration, why supporting processes like Change management has to be planned. During the project I was working with every unit of the whole organization. The planning phase required co-operation with the designers, purchasers, service managers, sales person and customer. This gave me a lot of experience and developed my leading and controlling knowledge. It changed my way of thinking. With the help of this valuable experience the new project management processes were developed.

After the conclusion of the final thesis the last phase supposes to be implemented. How everything will be put into practice? For this should be selected a suitable project, and it should be led by a project manager of the Industrial Services unit.

The clarification of the competence and resource needs of the Industrial Services unit has to be made. In the following list are some questions. For these questions should be answered, when the project management processes and competence of the Industrial Services unit will be further developed.

- How projects can be done fully by the Industrial Services unit?
- What kind of competence the Industrial Services unit needs for this?
- What kind of new resources is needed?
- Project managers and mechanical, software and automation designer?
- Are there any potential project managers in the Industrial Services unit?
- Are we able to move resources from the Factory unit?

The first step is to have a project manager. The second project manager can be added to Industrial Services unit, if earlier clarified project types will be fully transferred. At the beginning, when responsibility of the projects is partly transferred the project management costs can be noticed. For example system move design hours are formed mainly from the planning of the project manager. At the moment 20% of system move budget is designing. By having own project manager, borrowed design hours from the Factory unit stays low, about 5 % of the budget. Earlier in this chapter mentioned control modifications need a designer, a person who truly takes care of this work assignment. The full modification packets can be designed and sold, when other projects does not require so much attention.

These resources and competence can be borrowed from the Factory unit or might be possible to transfer the design and project management competence permanently to the Industrial Services unit. In this way a projecting team of the Industrial Services can be built up, thereby the orientation to the work will be much easier. These actions require hundred percent co-operations between every business units, and the spheres of responsibilities have to be clearly defined. This co-operation and improving changes lead our operations to the reliably functioning products and services, fast reaction times in problem situations, and to the absolute observing of delivery schedules.

The long distance control of projects cannot be done without functioning project measuring tools and economical success indicators. These measuring tools and indicators describe planned costs and benefits, resource needs and other requirements and objectives of a project. By this way the success of project can be measured. Later on it will be easier to analyze the earlier implemented projects. An observation of the indicators enables to develop the project management processes, for example with the cost-benefit calculations and benefit-risk analysis. Every new operation has to have a start and step by step developing methods. This will be the start, and the further requirements can be defined later on.

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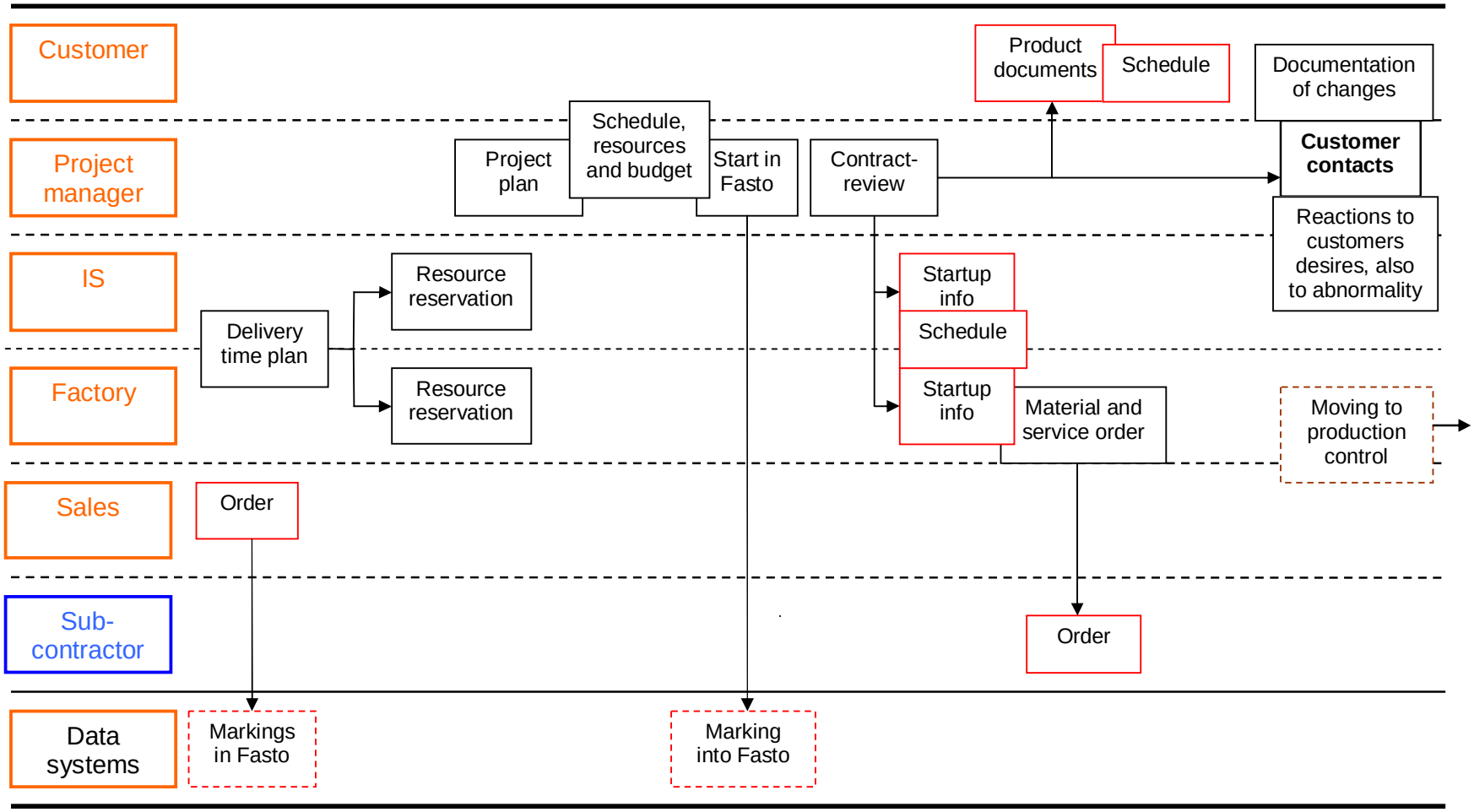
Appendixes

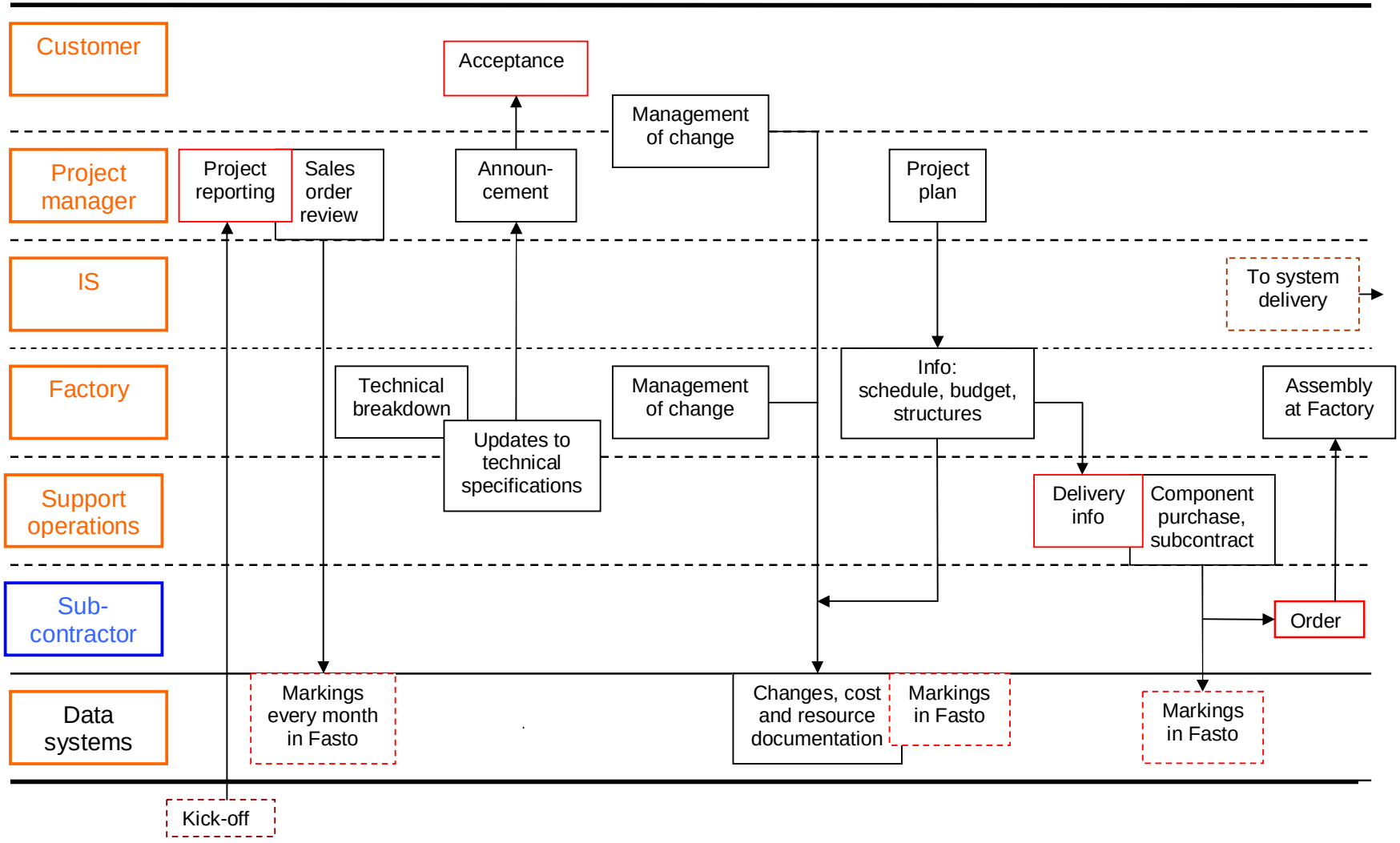
Kick off



Flowchart base on general code of conduct (fam-00059) of the delivery project management in Factory unit.

Appendix 1

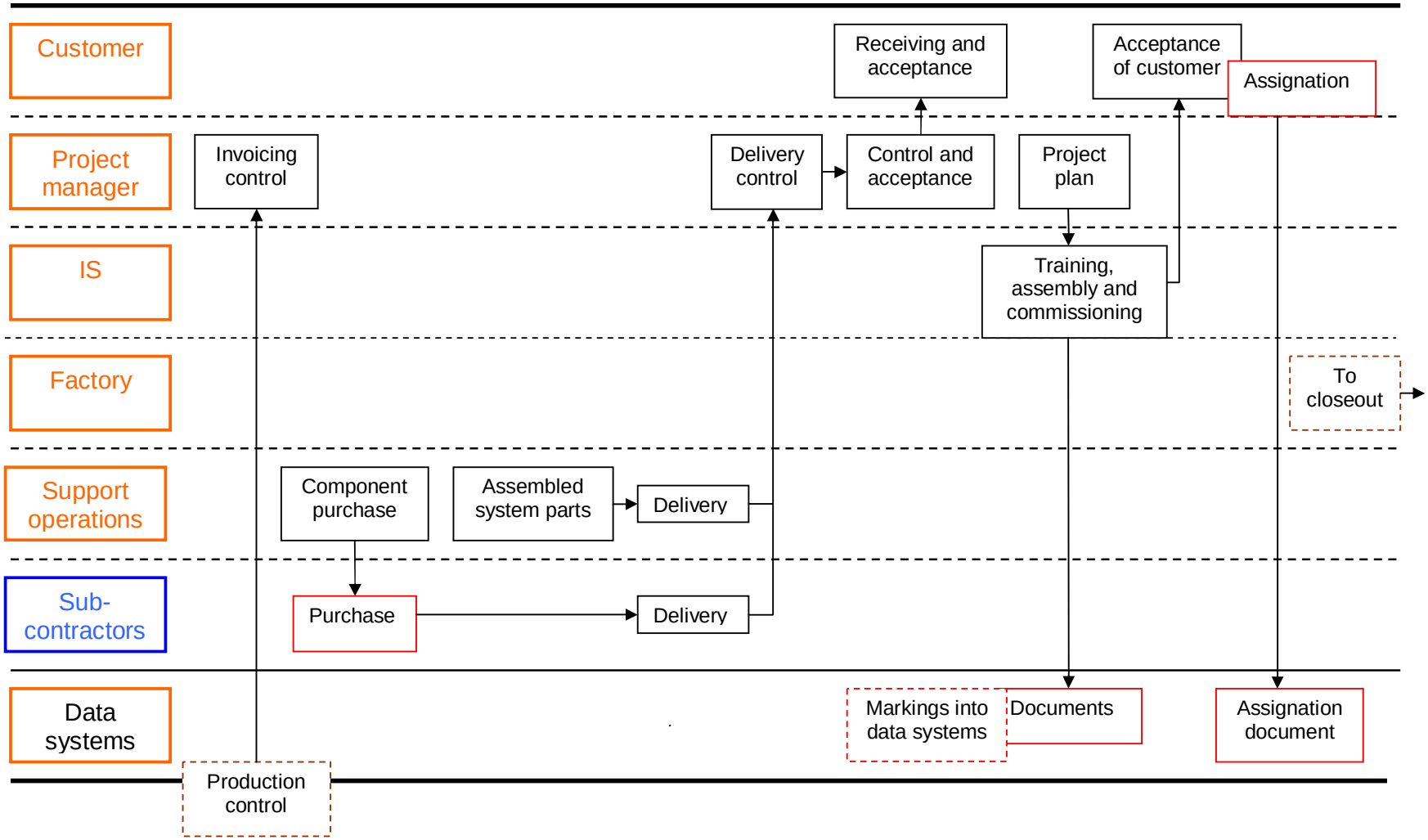
Production control



Flowchart base on general code of conduct (fam-00059) of the delivery project management in Factory unit.

Appendix 1

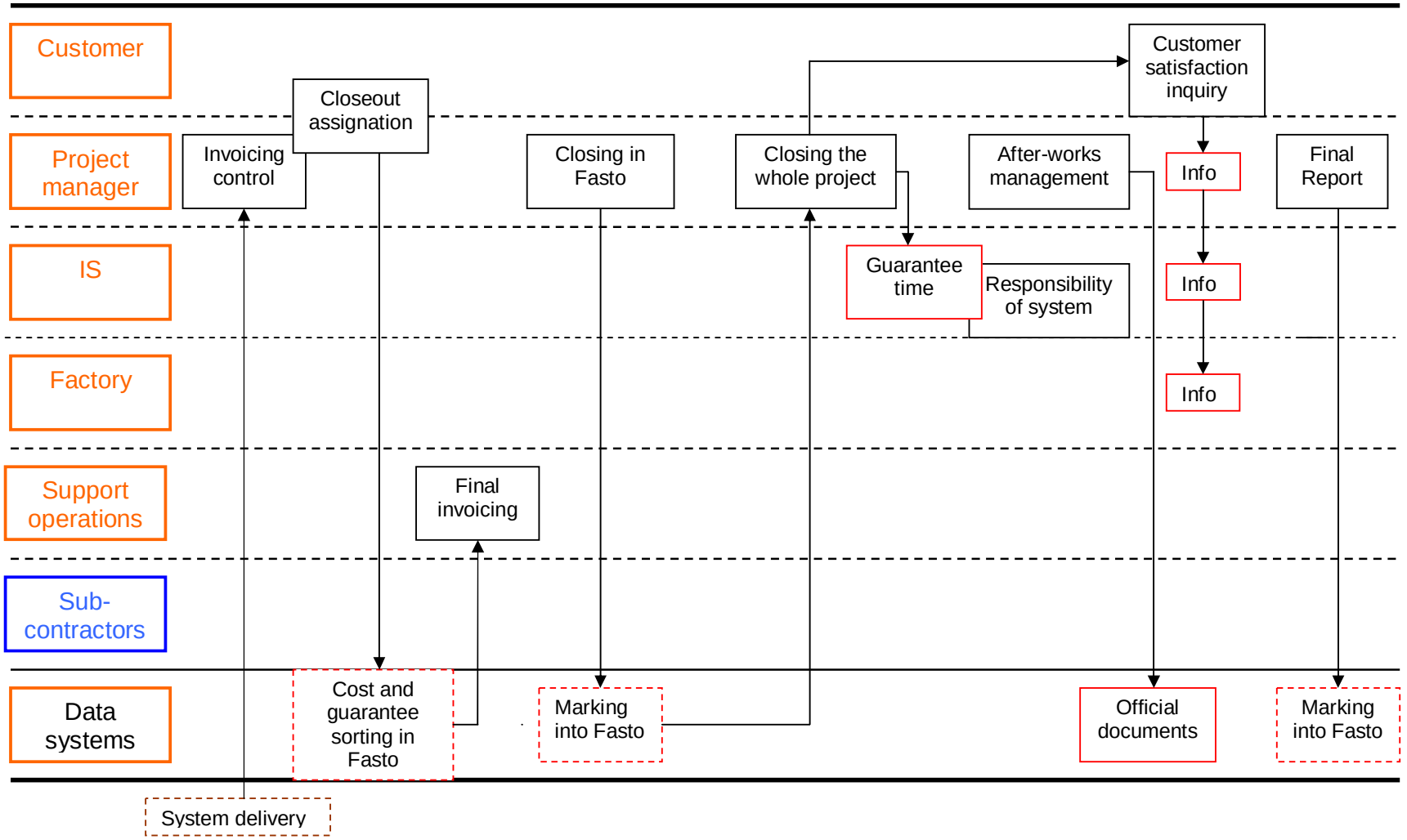
System delivery



Flowchart base on general code of conduct (fam-00059) of the delivery project management in Factory unit.

Appendix 1

Closeout



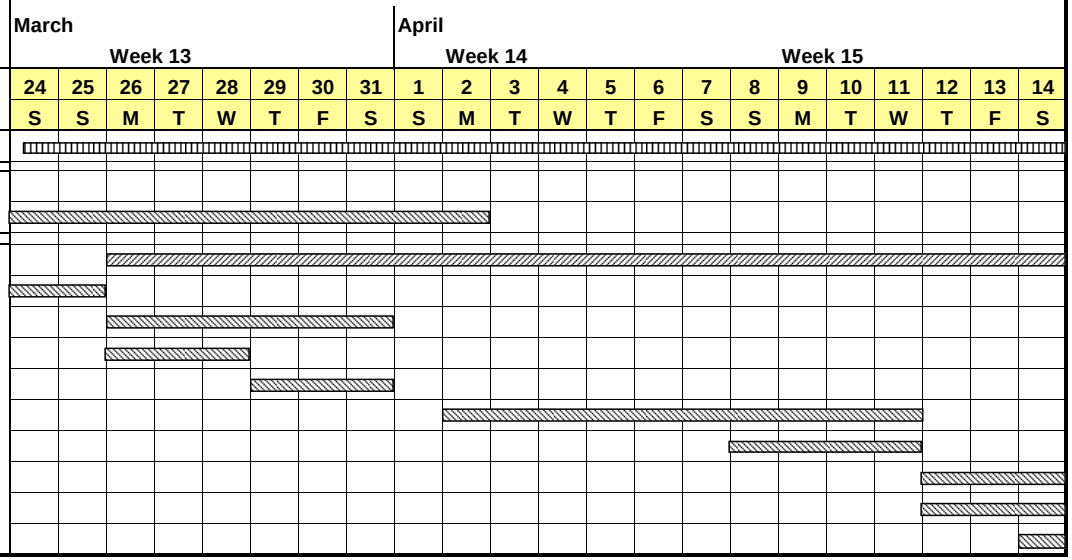
Flowchart base on general code of conduct (fam-00059) of the delivery project management in Factory unit.

Appendix 1

Project schedule of implementation phase of FMS move

System move schedule for:
Customer: **GD Schopfheim**
Project number: 643201
Updated at: 5.3.2006

Action	Author	Time of action
Duration of implementation		26.3 - 5.5
Deliveries		
Storage parts	Fastems	- 2.4
System 24501		
Cleaning	Customer	- 26.3
Storage dismantle	Fastems	26.3 - 31.3
Hüller Hilles dismantle	Customer	26.3 - 28.3
Transportation/Packing	Customer	29.3 - 31.3
Storage installation	Fastems	2.4 - 11.4
Hüller Hilles installation	Customer	8.4 - 11.4
Commissioning	Fastems	12.4 - 14.4
Tests	Fastems	12.4 - 14.4
Assignment	Both	14.4



This project was made for one customer that was making large-scale production reorganization. Three weeks long implementation period was the first phase of project that was led by thesis writer. Planned was also that afterwards another similar FMS will be moved. Project schedule for the second system in quite similar

Appendix 2

Quality and risk management

Checklist to increase the quality:

Installation area

Check floor slope	
Area and system are cleaned	
Conditions of installation place	
Enough space around the installation area	
Isolation of the installation place	
Available utilities (power supply, compressed air)	
Lifting machines above the system	
Cable channels	

Implementation phase

Implementation steps planned with all stakeholder	
Reasonable order installation	
Needs of commission	
Needs of training	
Remote connect	

Closeout phase

Cleaned installation area	
Device card updates	
Layouts	
Backup PLC	
Backup database	

Transportation (system move)

Plan transportation route	
Tool box transportation	
Forklift driving, required operator licenses	
Loading requirement (length of forks, max weight and height)	
Total needs of transportation surface of the vehicle	

Clearly divided responsibilities

Lifting and lifting tools	
Transportation	
Loading/unloading	
Packing	
System parts cleaning	
Communication keeper between stakeholders	
Material supply	
Machine supply	
Tool supply	

Material needs:

Offset sheets	
Cables	
Cable binders	
Anchors	
Screws	
Control update requires	

Equipments:

Machine needs

Forklift	
Scissor lift	
Machines reach required heights and carry enough	
Required licenses	

Lifting

Cranes for lifting	
Lifting equipments	
Lifting machines	
Required licenses	

Tool needs

Toolbox	
Hand tools needs	
Can something be borrow from customer	
Installation engineers has required licenses	
Required licenses	
Welding and grinding	

Analysis to avoid incomplete planning:

Reason for possible risks	Markings
Possible risk during project	
Earlier happed in same kind of project	
Preparation for the changes	
Project scope defined clearly	
Responsibilities divided clearly	
Knowledge of implementation team	
Plans and work breakdown are accurate	

Material and equipment needs are accurate	
Schedule is realistic	
All essentials duties and actions of stakeholders noticed	
Costs are based upon defined amount of implementation members	
Deliveries planned to meet the project schedule	
All safety requirements will be followed	

Method Statement and Risk Assessment

for the system move from Wimborne to Titchfield

Background information

Company details	Fastems Oy Ab Tuotekatu 4 33840 Tampere Finland
Customer details	Eaton Aerospace Ltd. Abbey Park Titchfield Fareham Hants PO14 4QA
Project number	25239
Project title	Eaton Aerospace system move from Wimborne to Titchfield
Contact persons	Matti Kangas Fastems Oy Ab matti.kangas@fastems.com +… Mark Woodford Eaton Aerospace +…

Method Stamement

Implementation and Control of Risk

Task	Method of Control
Arrival of material and equipment delivery	Forklift and packing materials, including wooden pallets will arrive on A.E.T. Transport Service vehicle. Access needed to enter into the customers factory. Transportation route is planned.
Arrival of installation team	Installation team will arrive with own car. Access needed to enter into the customers factory area
Dismantling	Safety shoes and safety glasses will be worn always at site, also hard hats during the installation. Ear protection used during the drilling and nut drill noise.
Arrival of A.E.T. Transport Service vehicle	Based on planned schedule, the transportation vehicle will arrive to customers factory area. Access needed to enter into customers factory area.
Transportation of system move	A.E.T. Transport Service have the responsibility of transport .
Transportation of installation team	Will be handled on behalf of the installation team. Driver has a required driving licence.
Re-assembly	Safety shoes and safety glasses will be worn always at site, also hard hats during the installation. Ear protection used during the drilling and nut drill noise.
Assembly of racking elements	Working on heights will be executed by using the scissor lift. Safety belts are used to minimize risk.

Rail and safety net installation.	Working on heights will be executed by using the scissor lift. Safety belts used to minimize risk.
Welding	When welding the upper and lower rail, the hot work equipment are available in the ground and scissor lift. Technicians have done the hot work training courses .
Stacker crane erection and assembly	For lifting heavy parts overhead crane used by authorized operator. Working on heights by using scissor lift. Safety belt used to minimaze risk.
Cable tray and cable installation	Working on heights by using the scissor lift. Safety belt are used.
Loading station installation	Fork lift will be used to lift and move station its place. Authorized operators.
Collection of equipments and material	Forklift and packing materials will collected by A.E.T. Transport Service vehicle. Access needed to enter into customers factory area.
Mori Seiki installation	Carried out by customer
Commissioning	Commissioning will be carried out by commissioning engineer(s)
Acceptance	When previously tasks are successfully accomplished, system is ready for acceptance.

On site control

Inspection of equipment	All equipment such as welding machine, tools and lifting equipments shall be regularly inspected before start of the work.
Awareness signal for customer	Access to the installation area is avoided for unauthorised persons by striping the installation area. Ready installed and commissioned system has integrated safety guardians and doors in areas where units are moved motorized or automatically.

Risk Assessment

Description of works	Dismantle of the FM-system at Eaton Aerospace in Wimborne. Transportation from Wimborne to Titchfield. Re-assembly and re-comissioning at Eaton Aerospace in Titchfield.
Obvious Hazards	Overturning of transportation vehicle during loading and unloading. Breaking of lifting beams or forks of forklift. Injury by noise, fire, flying parts and electric shock, when different equipments will be used. Next equipments have to be used with extra attention: scissor lift, fork lift, welding machine, angle dringer.
Who is at Risk	Fastems crew, installation team or commissioning engineer. Employees of Eaton Aerospace. Transportation crew of A.E.T. Transport Service. General public if they have access.
Likelihood of a potential incident	Minimal if method statement is followed
On Site Control	As attached method statement

In addition with Method Statement, other actions for avoiding risks:

1. All equipment is in current test or recently safety inspected by qualified persons.
2. Fastems crew have attended training and have past examinations, which are needed for forklift drivers, welding and crane operators.
3. We follow our quality policy according ISO9001.
4. Powder extinguisher and extinguish cover are included to Fastems equipment for installation period.
5. Hot work permit will be needed as well as permit to use compressed air and power supply.

Contact persons of transportation company

A.E.T. Transport Services Limited
Andrew Trotter
Managing Director

Telephone: …
Email: …

Fastems contact persons on-site

Installation:

Mr. Janne Hietaranta

Telephone: …

Commissioning:

Mr. Risto Polvinen

Telephone: …

Authorised: _____
Matti Kangas

Date: 29th of January 2007

Safe System of Hot Work

at Titchfield site

Background information

Customer details	Eaton Aerospace Ltd. Abbey Park Titchfield Fareham Hants PO14 4QA
Project number	25239
Project title	Eaton Aerospace system move from Wimborne to Titchfield
Persons in charge on site	Mark Woodford Eaton Aerospace markwoodford@eaton.com +… Janne Hietaranta Fastems Oy Ab +…
Aim of the safe system of hot work	Minimize the risks during the hot work. Prevent every kind of accidents, which might be caused by unplanned work.

Safe System of Hot Work

Description of hot works	MIG welding machine will be used during the re-assembly of the FM-system at Titchfield installation site.
Obvious Hazards	Injuries caused by noise, fire, flying parts and electric shock.
Who is at Risk	Installation team and employees of Eaton Aerospace as well as facilities.
Likelihood of a potential incident	Minimal if on site control is followed
On Site Control	Safety shoes and safety glasses will be worn. Installation engineer passed a hot work training courses, licenced. When one is doing welding, another will be ready to damp hot parts. Only tools which fill up the requirement of local electrical network will be used.

Other actions for avoiding risks:

1. All equipment is in current test or recently safety inspected by qualified persons.
2. Fastems crew have attended training and have past examinations, which are needed for forklift drivers, welding and crane operators.
3. We follow our quality policy according ISO9001.
4. Powder extinguisher and extinguish cover are included to Fastems equipment for installation period.
5. Hot work permit will be needed as well as permit to use compressed air and power supply.

Work breakdown structure to project manager

	Ask/Do/Supply	Feedback
Planning phase		
Make a project plan		x
Open project into Fasto		x
Startup info to other units and support services		
Resource requests		
Request material purchasing		
Delivery info to delivery operations		x
Delivery time info to customer		x
Inform implementation team		x
Implementation phase		
Invoice control		x
Startup info to installation team		x
Startup inquire from customer		x
Installation info from installation team		
Inform about commissioning		
Commissioning info from commissioner		
Closeout phase		
Acceptance request from customer		
Sort cost and guarantee, change status in Fasto		x
Final invoicing		x
Supply closeout info		x

This table consist work assignments, which have to be done by project manager. The last column describes the need of feedback. For example feedback for acceptance request has to come. The functionality of communication is in very important role, like every time.

X= no feedback

PROJECT:

Nr:

1	Project initial data
2	Project detail info
3	Plans (quality plan, risk analyses, time schedule)
4	Layouts
5	Technical documents(storage, stations, machines)
6	Control specifications, MMS
7	Project status
8	Official exchange of information
9	Project announcements (information during the project)
10	Packing and delivery
11	Changes
12	Account, invoicing
13	Invoicing, customer
14	Installation, commissioning, training (traveling, hotels)
15	Documents and filing
16	Final report

Fastems Group
Tuotekatu 4
FIN-33840 Tampere
Finland
Tel. +358 3 268 5111
Fax +358 3 268 5000

Project detail info

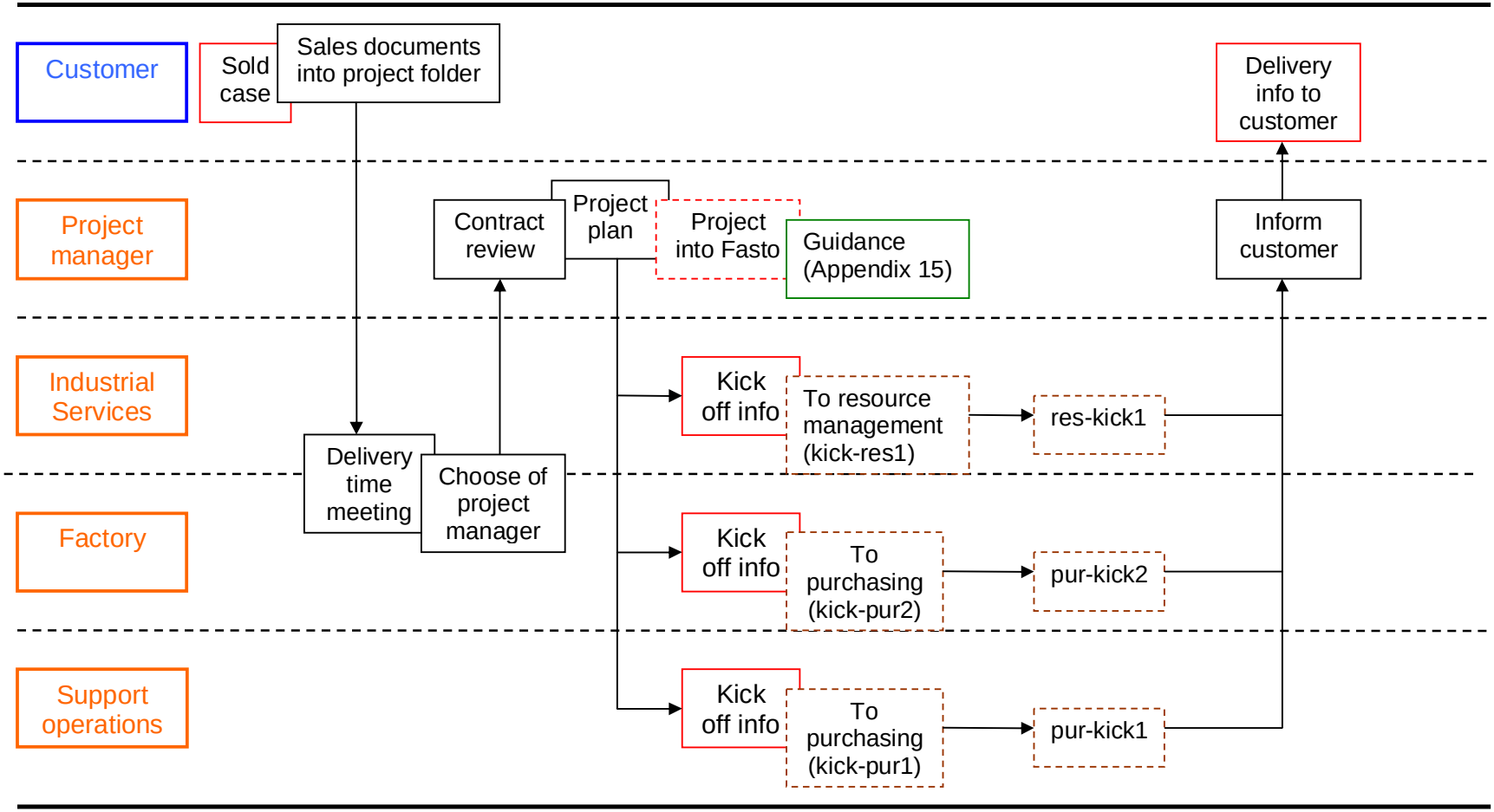
Project number:	643201
Project manager:	Matti Kangas Phone: +... Mail: …
Project description:	System moves of two MLS-MD System numbers: 24398 and 24501 Link to project folder: N:\IS\Projects\6432-Ger\643201 (includes for example Offer 310038.txt, audit_643201.doc, Sold.xls, Schedule 643201.xls)
Customer:	Gardner Denver Schopfheim GmbH
Contact person:	Werner Hollerbach Phone: +… Fax: +… Mail: …
Delivery address:	Gardner Denver Schopfheim GmbH Roggenbachstraβe 58 79650 Schopfheim Germany
Installation:	Dan Lundgren Phone +… Mail: …
Commissioning:	Supported by Teleservice and commission engineer if needed
Training:	No needed

This document is one part of electrical project folder, and made by a project manager.

Everyone, who takes a part to the project, can check some important project info.

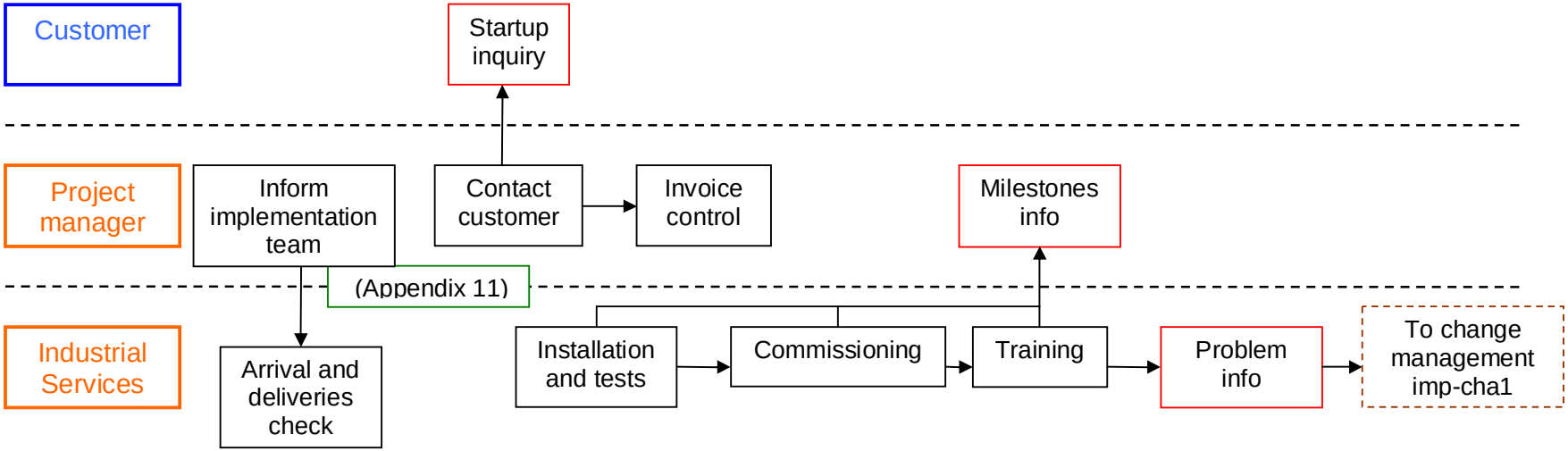
Document is fulfilled to be as an example.

Kick off



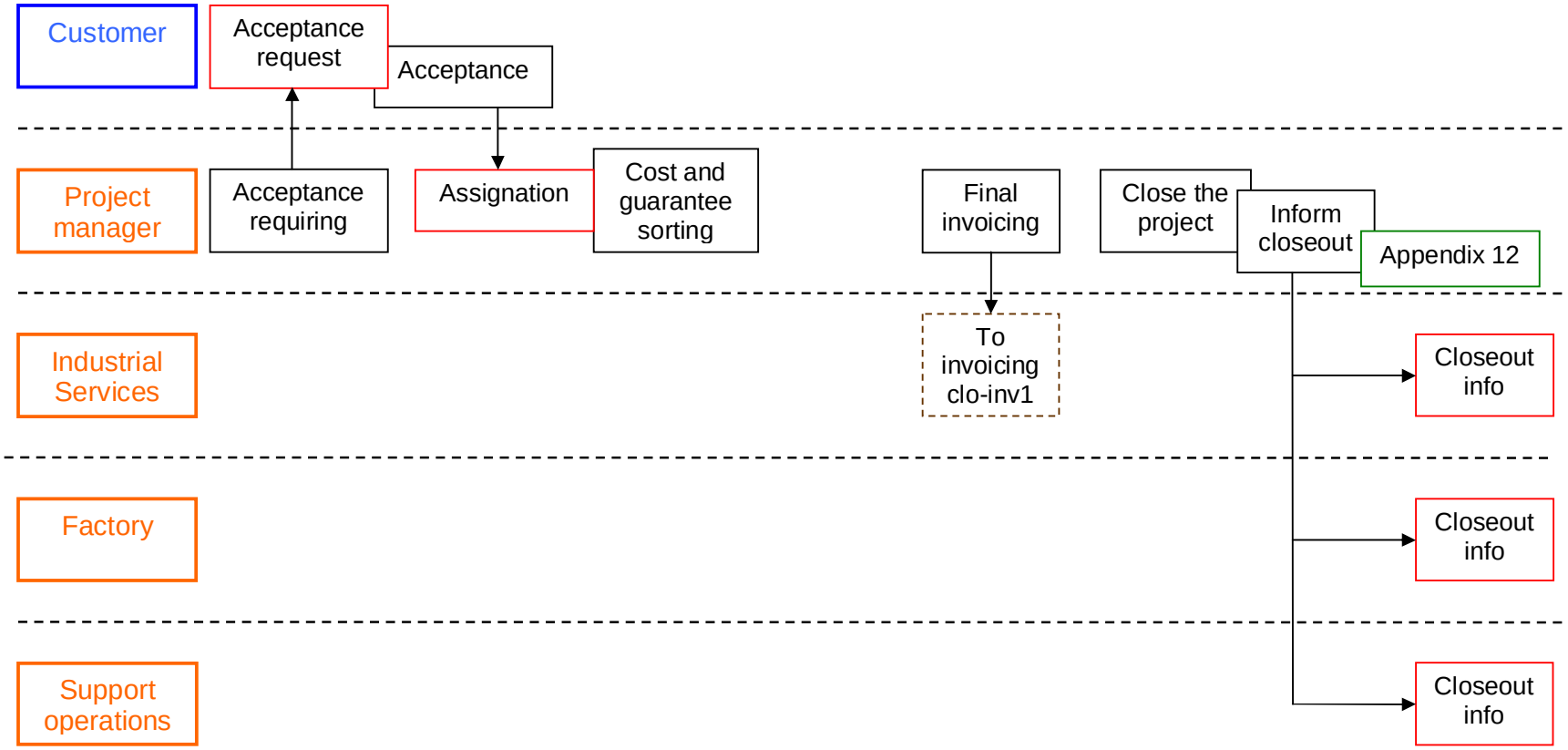
Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Implementation



Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Closeout



Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Flowchart color codes

To resource management (kick-res1)	Transfer to another flowchart
Delivery time meeting	Work assignment/Action/Notice
Kick off info	Info/Order
Markings into Fasto	Inputs to project control software
(Appendix 11)	Reference to appendix
→	Direction of process flow

Startup info

Project number:	643201
Project manager:	Matti Kangas Phone: +... Mail: …
Project description:	System moves of two MLS-MD System numbers: 24398 and 24501
Customer:	Gardner Denver Schopfheim GmbH
Addresses:	Roggenbachstraße 58 79650 Schopfheim Germany
Contact person:	Werner Hollerbach Phone: +… Fax: +… Mail: …
Planned schedule:	Schedule 643201.xls
Traveling:	If flight tickets needed, the travel manager has given accurate details.
Hotel:	Hotel Krone Hauri GmbH Am Rain 6 79650 Schopfheim

This document is also created by a project manager, and it will be delivered to all member of implementation team. Document is fulfilled to be as an example.

Closeout info

Project number: 643201

Project manager: Matti Kangas
Phone: +...
Mail: …

Receivers: Everyone, who involved to this project

Customer: Gardner Denver Schopfheim GmbH

Description of project: System moves of two MLS-MD
System numbers: 24398 and 24501

Customer satisfactory: Customer is clad when we kept our promises and everything work now fine

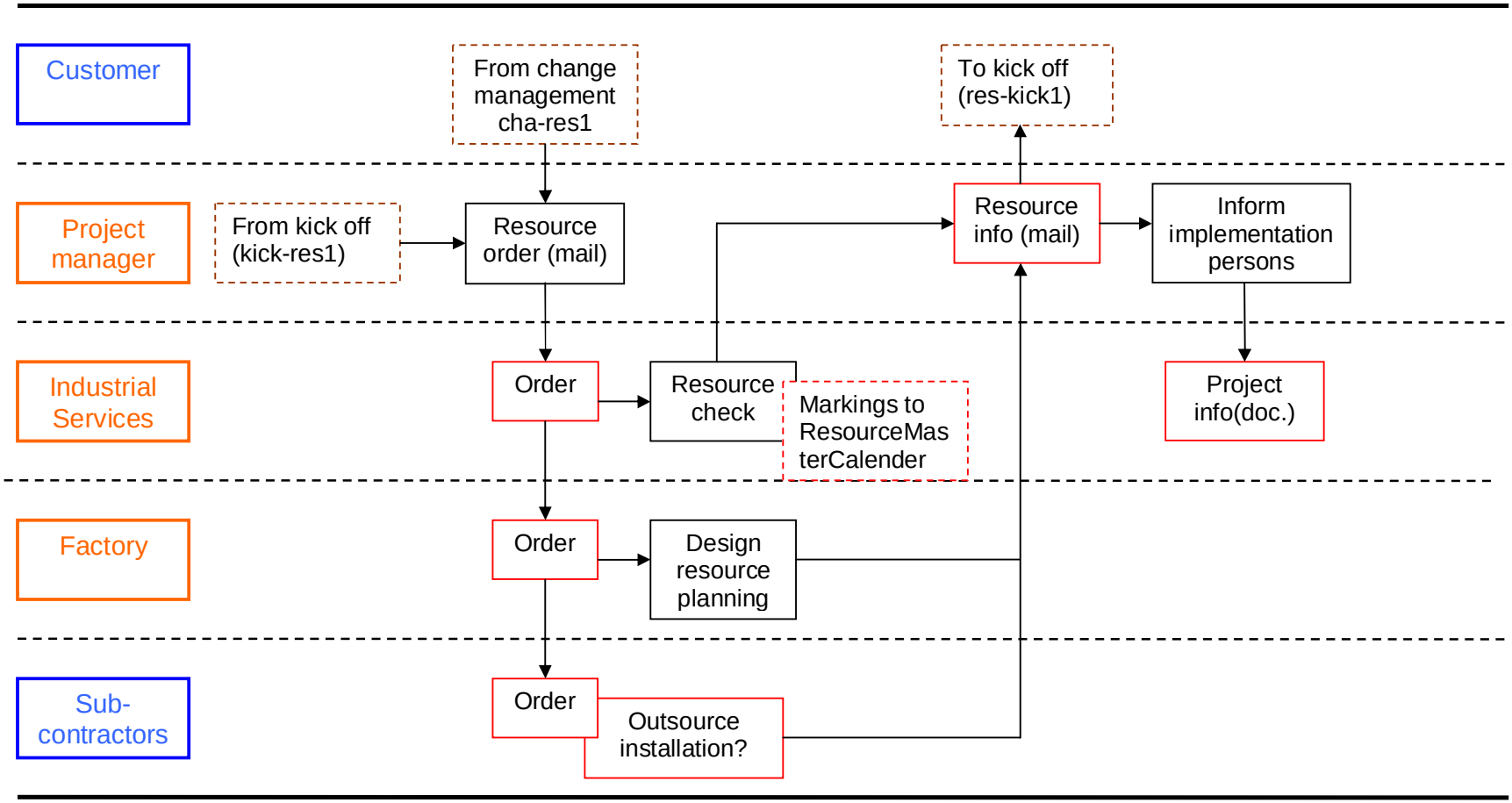
Economical summary: We kept the time and cost requirements. The financial result was 10 percent better than expected.

Information about project tail: Everything were finished successfully

Continuation plan: -

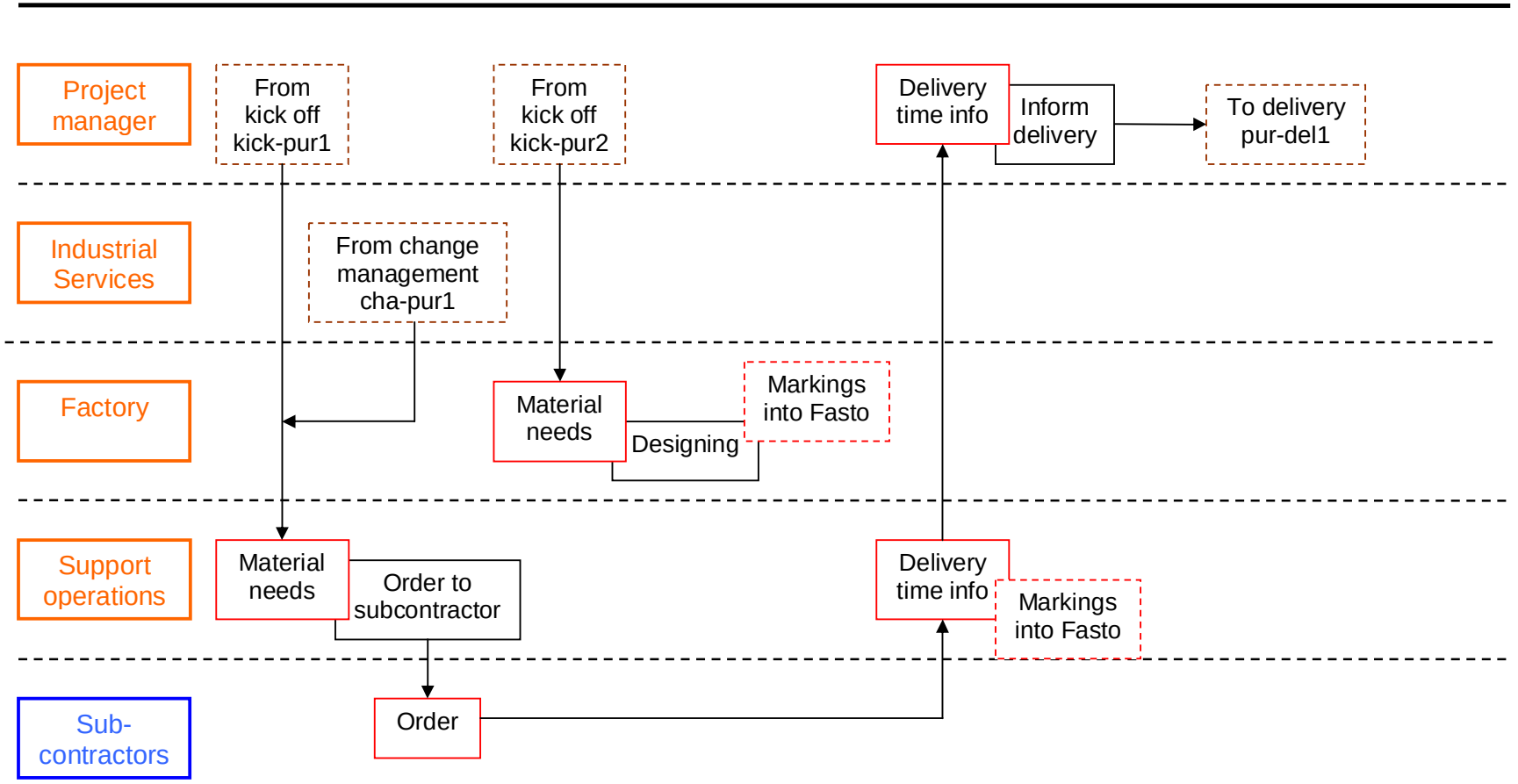
This document will be delivered to every person, who took a part to the project. It is fulfilled by the project manager, who described the success and possible continuation plan of the project. Document is fulfilled to be as an example.

Resource management



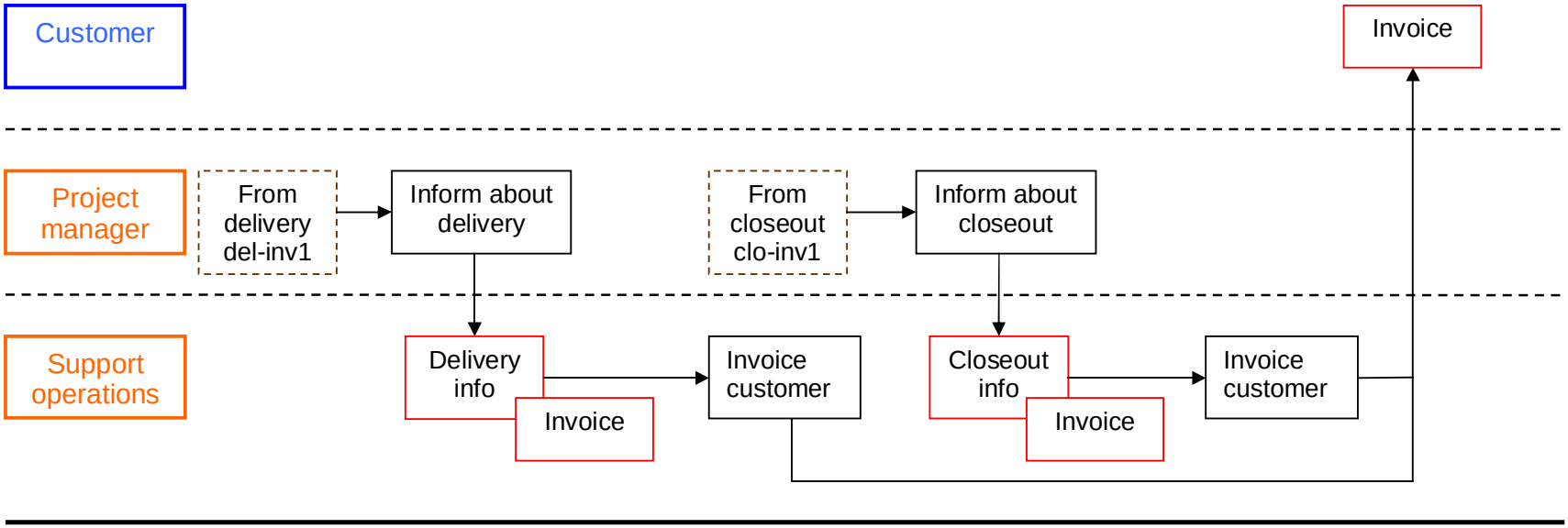
Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Purchasing



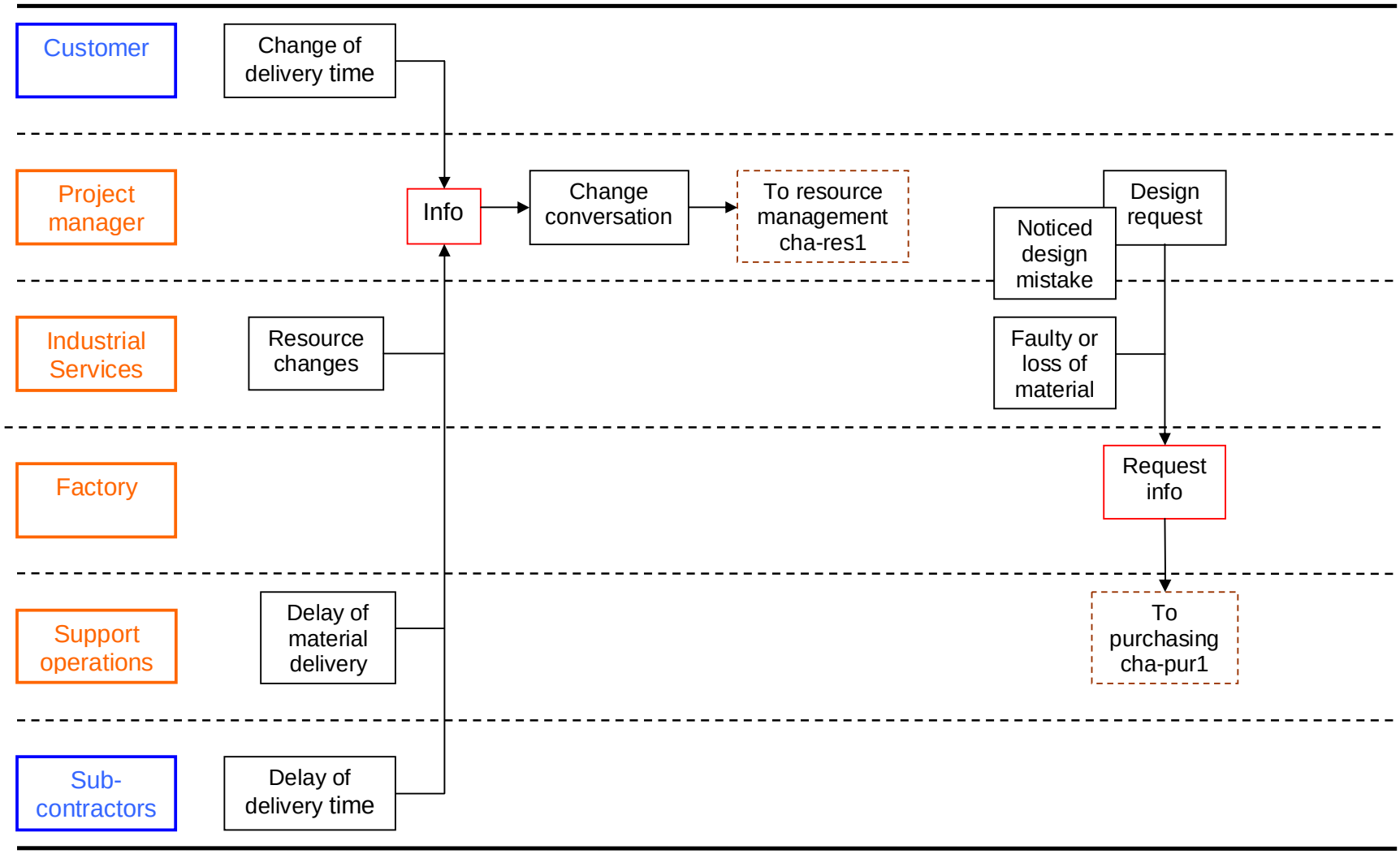
Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Invoicing



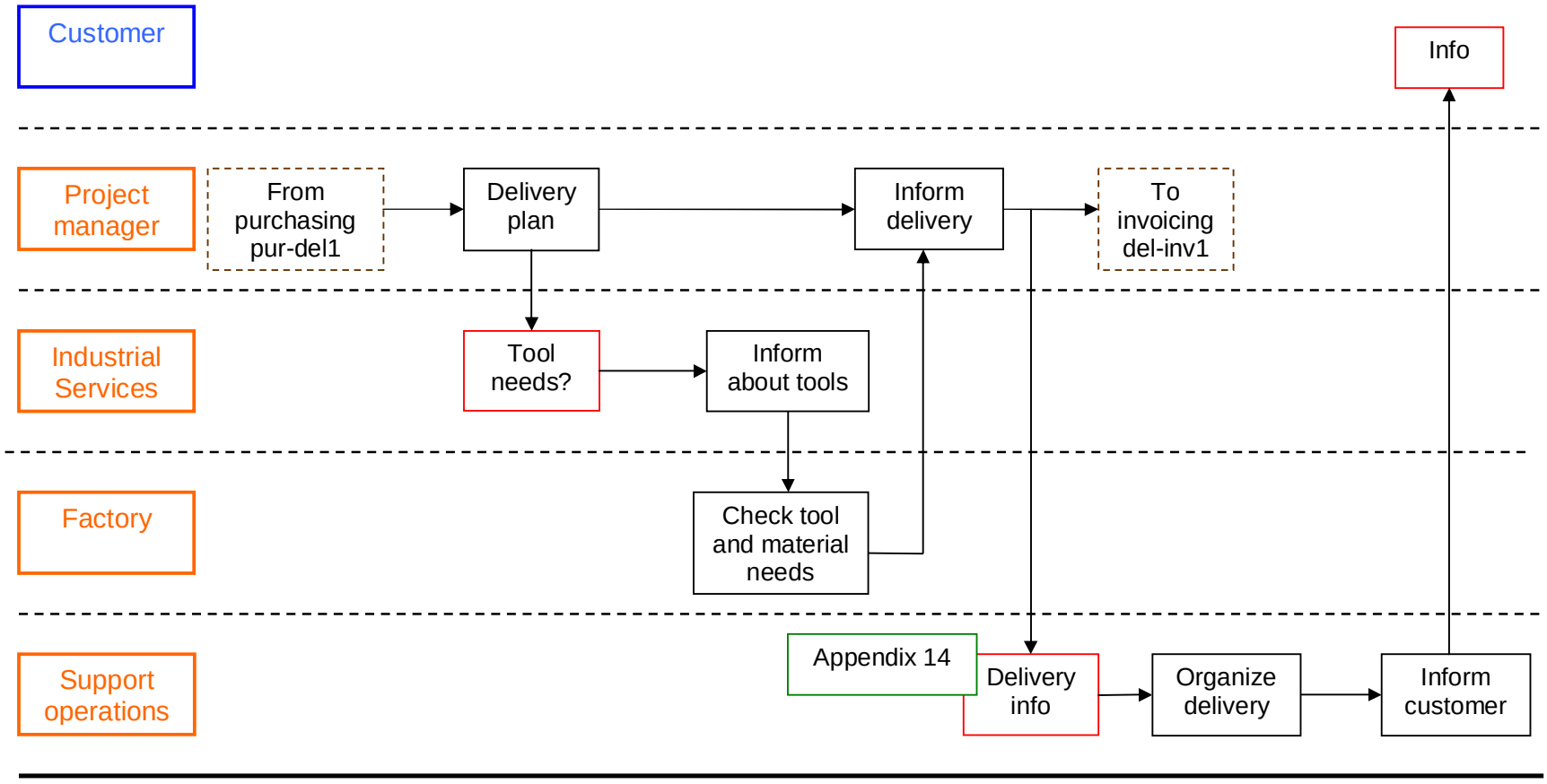
Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Change management



Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Delivery



Flowchart base on final thesis: Development of Project Management Process in Industrial Services unit.

Delivery info

Project number:	643201
Customer:	Gardner Denver Schopfheim GmbH
Delivery address:	Gardner Denver Schopfheim GmbH Roggenbachstraβe 58 79650 Schopfheim Germany
Contact person	Werner Hollerbach Phone: +… Fax: +… Mail: …
Contents of delivery:	Storage parts Leveling plates Fastening bolts (more accurate list of materials received from subcontractor)
Required date of arrival:	7.5.2007
Toolbox needs:	No needed
Required date of arrival:	-

This document is made by a project manager, and will be given to a person(s), who is responsible of sending operations. Document is fulfilled to be as an example.

Guidance for project opening into Fasto

1. Add activities

- Open Projects page in Fasto
- In project page, search for number of new project and model project(99999)
- Select also view-menu → model projects → also model projects
- Open Activities page of model project
- Select required activities, only first stage
- Select “mark copied” from Edit-menu
- Don’t close Activity page
- Open activity page of new project → select “add copied” from Edit-menu
- Select date copying before final adding

2. Change activities at under stages

Remove activities

- Choose activity
- Open Data page → remove
- With search tap you can refresh activity list

Change names of activity

- Choose activity
- Select “change title of activity” from Tools-menu
- Type right activity name → select OK

3. Create structure titles

Structure title to required material

- Go to Titles page in Fasto
- Search with short name of component (like Aisle LD)
- Select title → press new
- Change company name
- Erase old structure title
- Change cost center number
- Select “search title…” from Tools-menu → new structure title will appear to right place
- Choose save → select “cancel all”
- Write down new structure title (have add later)

4. **Add structure titles**

- Go to Projects page → open Activities page
- Add new title
- Check cost center and structure amount (1)

5. **Create manufacture structure**

- Open project from Projects page
- Select “create manufacture structure” from Tools-menu
- Add cost center number and check amount (1)
- Go to Manufacture structures page
- Search structure with FM+project number
- Add info text from Row-menu (for example, technician folder needed)
- When everything is ready, do hours estimations → open Activity page of the project → write down hour estimations, based on sales document (sold.xls)

6. **Info about the new project**

- Inform through mail
- Mail subject: Customers company and project number
- Announcement about opened project and delivery schedule

Fachhochschule Hannover
Maschinenbau
Organisations- und Prozessmanagement

Zusammenfassung der Diplomarbeit

Entwicklung eines Projektmanagementprozesses in der Abteilung Industrial Services, Fastems

Matti Kangas

Betreuende Mentoren	Prof. Dr.-Ing. Matthias Segner Prof. Dr. rer. pol. Wolfgang Greife
Auftraggeber	Fastems Oy Ab Abteilung Industrial Services

01. Juni 2007
Hannover

1. Einleitung

Im Februar 2006 beendete ich den ersten Teil meines Studiums in der Fachhochschule Tampere, Finnland. Im direkten Anschluss daran begann ich den zweiten Teil in der Fachhochschule Hannover. Meine Studienschwerpunkte in Tampere waren Maschinenautomatisierung und Produktionswirtschaft, in Hannover dagegen Organisations- und Prozessmanagement.

Das gesamte Studium verlief positiv und ich fand schon bald eine Diplomarbeitsstelle bei der Firma Fastems GmbH, einem finnischen Tochterunternehmen des Konzerns Fastems.

Die Wurzeln der Firma gehen auf Anfang 1900 zurück. Der Eigentümer ist Helvar Merca Oy Ab, eine finnische Firma in Privatbesitz. Bei Fastems sind ca. 370 Arbeiter beschäftigt, deren Arbeitsorte sich auf Großbritannien, Schweden, Italien, Frankreich, Litauen und Deutschland erstrecken.

Die Organisationsstruktur von Fastems Oy Ab setzt sich aus den oben genannten Niederlassungen zusammen.

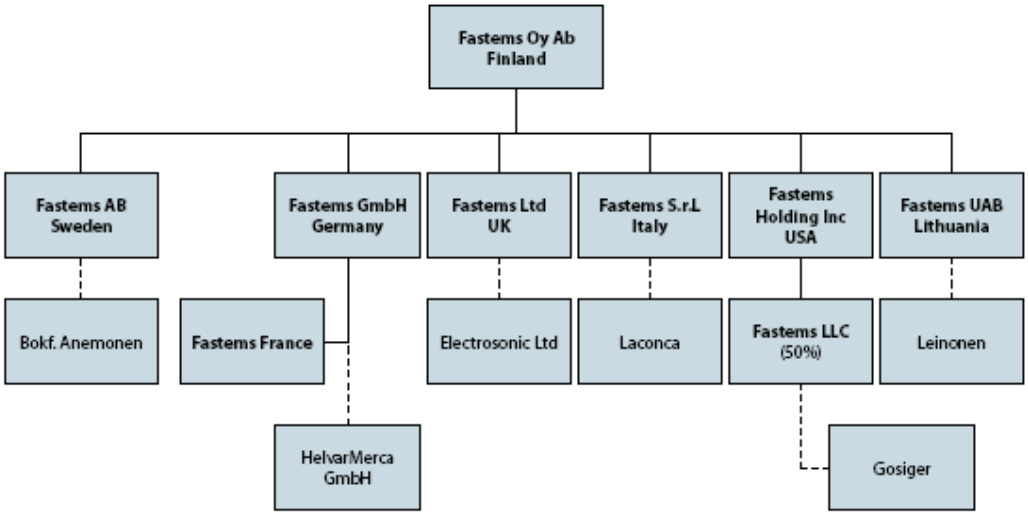


Abb. 1: Organisationsstruktur von Fastems

Fastems ist ein führender Hersteller von Lösungen zur Fabrikautomation und ein anerkannter Partner der Papier- und Plastikindustrie. Zu Kunden von Fastems gehören die Luftraum-, Automobil- und Maschinenbauindustrie.

Das Ziel der Firma ist, die Produktionen ihrer Kunden während aller 8760 Stunden im Jahr zu automatisieren und zu verbessern, was sich sogar im Namen des Firmenlogos widerspiegelt.

Abb. 2: Logo von Fastems

Zu den Werten von Fastems gehört die Wertschätzung von Vereinbarungen, Kundenzufriedenheit, Anerkennung von Partnern und Mitarbeitern, Beständigkeit und hohe technische Standards für alle Geräte.

2. Projektmanagement

Die Industrielle Revolution hat die Geschichte des Projektmanagements stark beeinflusst. Im 18. Jahrhundert verschoben sich die Schwerpunkte der Produktion vom Handwerk auf Fabriken. Die oft langen und multiplen Arbeitsphasen erforderten eine steigende Entwicklung von Transport, Lagerung, Produktion, Montage und Distribution. Hieraus entwickelten sich letztendlich die Methoden des Managements.

Der finale Durchbruch des Projektmanagements fand schließlich nach dem Zweiten Weltkrieg statt. Das amerikanische Militär entwickelte Methoden des Managements wie z.B. „earned value“, „work breakdown structures“ oder „total quality management“.

Mit Projektmanagement versucht man, ein festegelegtes Ziel mit einem definiertem Zeitplan und Budget zu erreichen. Diese beiden Anforderungen werden durch eine temporäre zusammengefasste Projektorganisation und andere Ressourcen erreicht.

2.1 Das Projektmanagement der Firma Fastems

In der Fabrikabteilung von Fastems wird bereits seit 20 Jahren Projektmanagement verwendet, welches das Management von Lieferungsprojekten der eigenen Produkte umfasst. Während dieser Zeit haben die Projektleiter handlungsorientiertes Wissen über die eigenen Projekte gesammelt und auf dieser Basis wurden entsprechende Managementverfahren und Managementwerkzeuge, wie z.B. interne Auditierung, Überprüfungs- und Aufgabenlisten oder Qualitätspläne entwickelt.

Lieferungsprojekttypen sind folgende:

- neue Systemlieferung
- Systemumzug
- Systemerweiterung
- Systemmodifikation

In den verschiedenen Projekttypen variiert das Budget zwischen 50.000 und 2.000.000 Euro, die Dauer von Konstruktionen zwischen 50 – 1.500 Stunden und von Installationen 50 -1.000 Stunden.

2.2 Entwicklung eines Projektmanagementprozesses in der Abteilung Industrial Services

Als Startpunkt für die Entwicklung des Projektmanagementprozesses wurde eine Untersuchung des Projektes durchgeführt, die in der Abteilung Industrial Services stattfinden könnte. Als Ergebnis kam heraus, dass die zu verschiebenen Projekte möglichst wenig mechanische oder elektrische Planung erhalten, da es dort diese Kompetenzen noch nicht gibt. Passende Projekttypen wären Systemumzug, -erweiterung und –modifikation.

Während des Umziehens einer Firma werden die den Organisationsstrukturen und Visionen ensprechenden Prozesse und Haupttätigkeiten erneut geplant. So geschah es auch bei Fastems und daraus resultierend wurde beschlossen, einen Projektmanagementprozess zu entwickeln. Zunächst müssen hierbei die Haupttätigkeiten bestimmt werden, im Anschluss daran ist eine Prozessbeschreibung der Firma möglich. Das Ziel der Haupttätigkeiten ist, die Erwartungen und Wünsche der Kunden zu erfüllen.

3. Projektmanagementprozesse

Nach der Bestimmung der Haupttätigkeiten kann nun der Projektmanagementprozess definiert werden. In der unteren Abbildung 3 sind die Haupt- und Unterstützungsprozesse des Projektmanagements dargestellt. Jeder Prozess besitzt eine Prozessbeschreibung, die Aufgaben, benötigte Informationswege und Anweisungen beinhaltet.

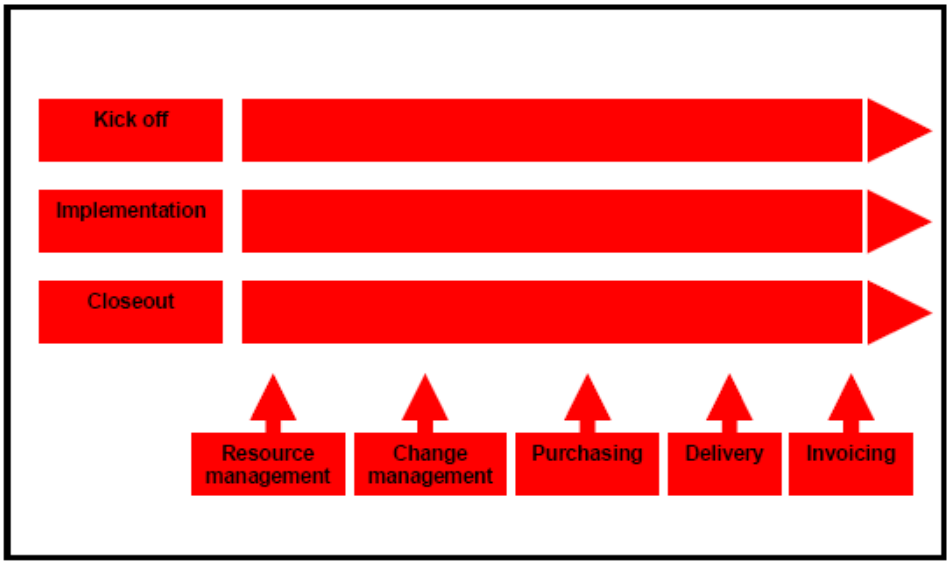


Abb. 3: Projektmanagementprozesse

3.1 Hauptprozesse

Der Weg der Projekte der Abteilung Industrial Services beinhalten drei Hauptprozesse:

- Startphase
- Realisierungsphase
- Schlussphase

In jedem Projekt finden sich diese Phasen, welche von Unterstützungsprozessen unterstützt werden. Diese drei Hauptprozesse kann man als Meilensteine von Projekten bezeichnen, da man deren Anfang und das Ende bestimmen kann. Mit Unterstützungsprozessen kann dies nicht erfolgen.

3.2 Unterstützungsprozesse

Die Unterstützungsprozesse sind während des gesamten Projektes aktiviert. Unterstützungsprozesse sind folgende:

- Ressourcen-Management
- Anschaffung
- Rechnungswesen
- Veränderungsmanagement
- Lieferung

4. Resümee

Mein Ziel war es, einen Projektmanagementprozess für die Abteilung Industrial Services zu entwickeln. Anfangs analysierte ich ein aktuelles Lieferungsprojektmanagement, danach untersuchte ich eine mögliche Projekttätigkeit in der Abteilung Industrial Services. Als Ergebnis entwickelte ich sowohl eine Beschreibung des Projektmanagementprozesses, als auch sich darauf beziehende Managementdokumente und -methoden.

Nach der Veränderung der Hauptprozesse der Firma und der Entwicklung der Prozesse verlangt die Inbetriebnahme der Veränderungen 100%ige Zusammenarbeit, es sollte immer ein Geben und Nehmen sein.
Auch das Verschieben von Ressourcen von einer Abteilung zur anderen ist möglich. Die Zusammenarbeit und die gemachten Veränderungen zielen jedoch immer auf die wichtigsten Aspekte der Firma; auf die zuverlässigen und stets funktionierenden Produkte und Dienstleistungen, die Reaktionsschnelligkeit bei Veränderungen und die Einhaltung von Lieferungszeiten.

Meine Diplomarbeit verlief meinen Vorstellungen entsprechend positiv. Mit dem Ergebnis meiner Arbeit bin ich sehr zufrieden und ich bin der Meinung, dass diese Diplomarbeit einen guten Startpunkt für eine weitere Entwicklung des Projektmanagements darstellt. Als Hilfe dienten mir das Fachwissen meiner Arbeitskollegen und die Möglichkeit, meine Diplomarbeit auch während meiner Arbeitszeiten zu schreiben.